

**STUDENTS' CRITICAL THINKING SKILL AND  
ENVIRONMENTAL AWARENESS IN LEARNING  
ENVIRONMENTAL POLLUTION USING INSTAGRAM-  
MEDIATED SAMR MODEL**

**Research Paper**

Submitted as Requirement to Obtain Degree of *Sarjana Pendidikan* in  
International Program on Science Education (IPSE) Study Program



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**INTERNATIONAL PROGRAM ON SCIENCE EDUCATION  
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UNIVERSITAS PENDIDIKAN INDONESIA**

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**RESEARCH PAPER APPROVAL FORM**  
**STUDENTS' CRITICAL THINKING SKILL AND ENVIRONMENTAL**  
**AWARENESS IN LEARNING ENVIRONMENTAL POLLUTION USING**  
**INSTAGRAM-MEDIATED SAMR MODEL**

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**DECLARATION**

I hereby declare that every aspect written in this research paper entitled “Students’ Critical Thinking Skill And Environmental Awareness in Learning Environmental

Pollution Using Instagram-mediated SAMR Model” is truly the result of my own ideas, efforts, and work. I declare that every part of this research paper entitled is truly the product of my own concept, effort and work. The theories, specialist conclusions, views and other items contained in this document were cited on the basis of UPI's science code and in accordance with scientific ethics applicable in scholarly society. This statement is truthfully and consciously developed. If there is consequently an infringement of scientific ethics or if there is any other claim to the authenticity of this research paper, I am therefore prepared to be liable and accept academic sanctions in accordance with the guidelines.

Bandung, August 2019

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**ABSTRACT**

Environmental awareness is essential for student understanding of the environment's current situation and the importance of its protection. However, limited class time and huge class size issues have limited student involvement and thinking attempts. Consequently, the results of class discussion tend to end up being superficial, having little impact on student environmental awareness and critical thinking. This study aims to analyze students' critical thinking skill and environmental awareness in learning environmental pollution through Instagram-mediated SAMR model. At the end of the research, student learning satisfaction was also measured. The students involved in this research were instructed to follow an Instagram account in which they learned the topic, interacted with each other and the teacher, and submitted their vlog projects. Students' critical thinking skill data was collected using a rubric, while students' environmental awareness and learning satisfaction data were collected using online questionnaires. The data was analyzed descriptively. Students' critical thinking skill average score is categorized as satisfactory, their environmental awareness shows that the students do care about environmental issues, and their learning satisfaction rating percentage is 77% which means the students are very satisfied with the learning activity.

**Keywords:** Students Critical Thinking Skill, Students Environmental Awareness, Environmental Pollution, SAMR Model, Instagram

**KETERAMPILAN BERPIKIR KRITIS DAN KESADARAN  
LINGKUNGAN SISWA DALAM MEMPELAJARI PENCEMARAN  
LINGKUNGAN MENGGUNAKAN MODEL SAMR YANG DIMEDIASI  
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**ABSTRAK**

Kesadaran lingkungan merupakan hal yang sangat penting untuk pemahaman siswa tentang situasi lingkungan saat ini dan pentingnya perlindungan lingkungan. Namun, masalah waktu pembelajaran yang terbatas dan ukuran kelas yang relatif besar telah membatasi keterlibatan dan upaya berpikir siswa di dalam kelas. Akibatnya, hasil diskusi kelas cenderung bersifat dangkal, tidak banyak berdampak pada kesadaran lingkungan dan pemikiran kritis siswa. Penelitian ini bertujuan untuk menganalisis keterampilan berpikir kritis dan kesadaran lingkungan siswa dalam mempelajari pencemaran lingkungan melalui model SAMR yang dimediasi *Instagram*. Pada akhir penelitian, kepuasan belajar siswa juga diukur. Para siswa yang terlibat dalam penelitian ini diinstruksikan untuk mengikuti akun *Instagram* di mana mereka mempelajari topik tersebut, berinteraksi satu sama lain dan dengan guru dan menyerahkan proyek *vlog* mereka. Data keterampilan berpikir kritis siswa dikumpulkan menggunakan rubrik, sedangkan data kepedulian lingkungan dan kepuasan belajar siswa dikumpulkan menggunakan kuesioner *online*. Data dianalisis secara deskriptif. Nilai rata-rata keterampilan berpikir kritis siswa dikategorikan memuaskan, kesadaran lingkungan mereka menunjukkan bahwa siswa peduli terhadap masalah lingkungan, dan persentase peringkat kepuasan belajar mereka adalah 77% yang berarti siswa sangat puas dengan kegiatan pembelajaran.

**Kata kunci:** Keterampilan Berpikir Kritis Siswa, Kesadaran Lingkungan Siswa, Pencemaran Lingkungan, Model SAMR, Instagram

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Because of His Mercy and Grace, all praise belongs to Allah SWT, the author could complete this research paper. *Salawat* and *Salaam* could be sent to Muhammad the prophet, His last Messengers and Prophet, His family, companions, and all those who follow His steps to the end of time.

The research paper is the last University requirement for obtaining *Sarjana*. As part of millennial generation, the author is concerned with teaching operations that could provide a platform to improve the skills of learners, particularly in critical thinking skill and environmental awareness. The author is prepared to explain the studies undertaken by the author through this research paper. The description consists of five sections; introduction, literature review, research methodology, result and discussion, and conclusion and recommendation.

To Allah belongs the perfection. The author understands that it is necessary to fix and improve many weaknesses or constraints. Suggestions, remarks and recommendations for the better quality of the teaching process are thus publicly welcomed. Hopefully this study can be helpful for the education of science and can be a reference for improved execution of learning and teaching.

Bandung, August 2019

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## LIST OF CONTENTS

<u>RESEARCH PAPER APPROVAL FORM</u> .....	iii
<u>DECLARATION</u> .....	iii
<u>ABSTRACT</u> .....	v
<u>PREFACE</u> .....	vii
<u>ACKNOWLEDGEMENT</u> .....	viii
<u>LIST OF TABLES</u> .....	xiv
<u>LIST OF FIGURES</u> .....	xvi
<u>LIST OF APPENDICES</u> .....	xviiiw
<u>CHAPTER I</u> .....	<b>Error! Bookmark not defined.</b>
<u>INTRODUCTION</u> .....	<b>Error! Bookmark not defined.</b>
<u>1.1 Background</u> .....	<b>Error! Bookmark not defined.</b>
<u>1.2 Research Problem</u> .....	<b>Error! Bookmark not defined.</b>
<u>1.3 Research Question</u> .....	<b>Error! Bookmark not defined.</b>
<u>1.4 Research Objective</u> .....	<b>Error! Bookmark not defined.</b>
<u>1.5 Limitation of Problem</u> .....	<b>Error! Bookmark not defined.</b>
<u>1.6 Research Benefit</u> .....	<b>Error! Bookmark not defined.</b>
<u>1.7 The Organization of Research Paper</u> .....	<b>Error! Bookmark not defined.</b>
<u>CHAPTER II</u> .....	<b>Error! Bookmark not defined.</b>
<u>LITERATURE REVIEW</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.1 SAMR Model</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.1.1 The Definition of SAMR Model</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.1.2 The Use of SAMR Model</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.2 Instagram</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.2.1 Instagram Definiton</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.2.2 Features of Instagram</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.3 Students' Critical Thinking Skill</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.3.1 Purpose Element of Thought</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.3.2 Problem or Issue Element of Thought</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.3.3 Point of View Element of Thought</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.3.4 Information Element of Thought</u> .....	<b>Error! Bookmark not defined.</b>
<u>2.3.5 Concepts Element of Thought</u> .....	<b>Error! Bookmark not defined.</b>

2.3.6	<u>Assumptions Element of Thought</u> ...	<b>Error! Bookmark not defined.</b>
2.3.7	<u>Interpretations Element of Thought</u> .	<b>Error! Bookmark not defined.</b>
2.3.8	<u>Implication Element of Thought</u> .....	<b>Error! Bookmark not defined.</b>
2.4	<u>Students' Environmental Awareness</u> .....	<b>Error! Bookmark not defined.</b>
2.4.1	<u>Personal Responsibility Factor</u> .....	<b>Error! Bookmark not defined.</b>
2.4.2	<u>Interest in Attitude Factor</u> .....	<b>Error! Bookmark not defined.</b>
2.4.3	<u>Awareness in Daily Life Factor</u> .....	<b>Error! Bookmark not defined.</b>
2.4.4	<u>Judgment of Others Factor</u> .....	<b>Error! Bookmark not defined.</b>
2.4.5	<u>Environmental Information Factor</u> ..	<b>Error! Bookmark not defined.</b>
2.5	<u>Environmental Pollution</u> .....	<b>Error! Bookmark not defined.</b>
2.5.1	<u>Forest Destruction</u> .....	<b>Error! Bookmark not defined.</b>
2.5.2	<u>Air Pollution</u> .....	<b>Error! Bookmark not defined.</b>
2.5.3	<u>Water Pollution</u> .....	<b>Error! Bookmark not defined.</b>
2.5.4	<u>Soil Pollution</u> .....	<b>Error! Bookmark not defined.</b>
2.5.5	<u>Sound Pollution</u> .....	<b>Error! Bookmark not defined.</b>
2.5.6	<u>Management of the Environment</u> ....	<b>Error! Bookmark not defined.</b>
2.6	<u>Relevant Research</u> .....	<b>Error! Bookmark not defined.</b>
<b>CHAPTER III</b> .....		<b>Error! Bookmark not defined.</b>
<b>RESEARCH METHODOLOGY</b> .....		<b>Error! Bookmark not defined.</b>
3.1	<u>Research Method</u> .....	<b>Error! Bookmark not defined.</b>
3.2	<u>Research Design</u> .....	<b>Error! Bookmark not defined.</b>
3.3	<u>Population and Sample</u> .....	<b>Error! Bookmark not defined.</b>
3.4	<u>Operational Definition</u> .....	<b>Error! Bookmark not defined.</b>
4.5	<u>Research Instrument</u> .....	<b>Error! Bookmark not defined.</b>
4.5.1	<u>Critical Thinking Grid</u> .....	<b>Error! Bookmark not defined.</b>
4.5.2	<u>Observation Sheet</u> .....	<b>Error! Bookmark not defined.</b>
4.5.3	<u>Student Environmental Awareness Questionnaire</u>	<b>Error! Bookmark not defined.</b>
4.5.4	<u>Student Learning Satisfaction Questionnaire</u>	<b>Error! Bookmark not defined.</b>
4.6	<u>Instrument Development and Analysis</u> ...	<b>Error! Bookmark not defined.</b>
4.6.1	<u>Reliability of Questionnaire</u> .....	<b>Error! Bookmark not defined.</b>
4.7	<u>Instrument Analysis Result</u> .....	<b>Error! Bookmark not defined.</b>

4.8	<u>Data Processing Technique</u> .....	<b>Error! Bookmark not defined.</b>
4.8.1	<u>Score of Critical Thinking Skill</u> .....	<b>Error! Bookmark not defined.</b>
4.8.2	<u>Analysis of Environmental Awareness in Daily Life Questionnaire</u> .....	<b>Error! Bookmark not defined.</b>
4.8.3	<u>Score Calculation of Student Learning Satisfaction Questionnaire</u> <b>Error! Bookmark not defined.</b>	
4.9	<u>Research Procedure</u> .....	<b>Error! Bookmark not defined.</b>
<u>CHAPTER IV</u> .....		<b>Error! Bookmark not defined.</b>
<u>RESULTS AND DISCUSSION</u> .....		<b>Error! Bookmark not defined.</b>
4.1	<u>Students Critical Thinking Skill</u> .....	<b>Error! Bookmark not defined.</b>
4.1.1	<u>Students Critical Thinking in Purpose</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.1.2	<u>Students Critical Thinking in Problem or Issue</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.1.3	<u>Students Critical Thinking in Point of View</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.1.4	<u>Students Critical Thinking in Information</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.1.5	<u>Students Critical Thinking in Concepts</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.1.6	<u>Students Critical Thinking in Assumptions</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.1.7	<u>Students Critical Thinking in Interpretations</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.1.8	<u>Students Critical Thinking in Implication</u> <b>Error!</b>	<b>Bookmark not defined.</b>
4.2	<u>Students Environmental Awareness</u> .....	<b>Error! Bookmark not defined.</b>
4.2.1	<u>Students Response to Personal Responsibility Prompts</u> .....	<b>Error! Bookmark not defined.</b>
4.2.2	<u>Students Response to Interest in Attitude Prompts</u> .....	<b>Error! Bookmark not defined.</b>
4.2.3	<u>Students Response to Awareness in Daily Life Prompts</u> .....	<b>Error! Bookmark not defined.</b>
4.2.4	<u>Students Response to Judgment of Others Prompts</u> .....	<b>Error! Bookmark not defined.</b>

4.2.5	<u>Students Response to Environmental Information Prompts</u> ....	<b>Error! Bookmark not defined.</b>
4.3	<u>Students Learning Satisfaction</u> .....	<b>Error! Bookmark not defined.</b>
	<u>CHAPTER V</u> .....	<b>Error! Bookmark not defined.</b>
	<u>CONCLUSION AND RECOMMENDATION</u> ....	<b>Error! Bookmark not defined.</b>
5.1	<u>Conclusion</u> .....	<b>Error! Bookmark not defined.</b>
5.2	<u>Implication</u> .....	<b>Error! Bookmark not defined.</b>
5.3	<u>Recommendation</u> .....	<b>Error! Bookmark not defined.</b>
	<u>REFERENCES</u> .....	<b>Error! Bookmark not defined.</b>
	<u>AUTOBIOGRAPHY</u> .....	<b>Error! Bookmark not defined.</b>

## LIST OF TABLES

<u>Table 2.1 Analysis of Core Competence and Basic Competence of Environmental Pollution Topic based on 2013 Curriculum</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 2.2 Synthesis of the First Relevant Research</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 2.3 Synthesis of the Second Relevant Research</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 2.4 Synthesis of the Third Relevant Research</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 2.5 Synthesis of the Fourth Relevant Research</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 2.6 Synthesis of the Fifth Relevant Research</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.1 Critical Thinking Grid .....</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.2 Environmental Awareness in Daily Activity Questionnaire .....</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.3 Student Learning Satisfaction Questionnaire</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.4 A Rule of Thumb for Interpreting Alpha</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.5 Reliability Statistics of Environmental Awareness in Daily Activity Questionnaire .....</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.6 Reliability Statistics of Student Learning Satisfaction Questionnaire .....</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.7 Interpretation Criteria of Critical Thinking Skill Mean Score.....</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 3.8 Interpretation Criteria of Rating Percentage</u>	<b>Error!</b>	<b>Bookmark</b>	<b>not defined.</b>
<u>Table 4.1 Total Rating Score Percentage of Students' Learning Satisfaction and Its</u>			

Interpretation.....**Erro**  
**r! Bookmark not defined.**

## LIST OF FIGURES

<u>Figure 2.1 Substitution, Augmentation, Modification and Redefinition (SAMR) model (Puentedura, 2006).....</u>	<b>Error! Bookmark not defined.</b>
<b>No table of figures entries found.</b> <u>Figure 4.1 Average Critical Thinking Skill Score _____ for _____ Each _____ Critical _____ Thinking Element.....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.2 An example of students' observation of environmental pollution in their Instagram post .....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.3 An example of students discussing how to overcome the pollution problem .....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.4 Screenshot of Instagram caption example that discusses how to solve pollution and its translation.....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.5 Screenshot of Instagram caption example that represents students' identification of problem and its translation</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.6 Screenshot of Instagram caption example of students' point of view and its translation.....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.7 Screenshot of Instagram caption example of students' information usage and its translation .....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.8 Screenshot of Instagram caption example of students' concept usage and its translation.....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.9 Screenshot of Instagram caption example of students' assumption and its translation .....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.10 Screenshot of Instagram caption example of students' interpretation and its translation .....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.11 Screenshot of Instagram caption example of students' implication and its translation .....</u>	<b>Error! Bookmark not defined.</b>
<u>Figure 4.12 Percentage of critical thinkig skill categories of the students' critical thinking skill after learning environmental pollution using SAMR model through Instagram .....</u>	<b>Error! Bookmark not defined.</b>



Figure 4.13 Percentage of students' responses to each prompts representing the personal responsibility factor ..... Error! Bookmark not defined.

Figure 4.14 Screenshot of an example of students' Instagram caption concerning their personal action responsibility awareness towards the environment ..... Error! Bookmark not defined.

Figure 4.15 Percentage of students' responses to each prompts representing the interest in attitude factor ..... Error! Bookmark not defined.

Figure 4.16 Percentage of students' responses to each prompts representing the awareness in daily life factor..... Error! Bookmark not defined.

Figure 4.17 Percentage of students' responses to each prompts representing the judgment of others factor ..... Error! Bookmark not defined.

Figure 4.18 Percentage of students' responses to each prompts representing the environmental information factor ..... Error! Bookmark not defined.

## LIST OF APPENDICES

### APPENDIX A INSTRUCTIONAL TOOLS

APPENDIX A.1 Permission Letter ..... **Error! Bookmark not defined.**

APPENDIX A.2 Instagram Account ..... **Error! Bookmark not defined.**

APPENDIX A.3 Lesson Plan ..... **Error! Bookmark not defined.**

### APPENDIX B RESEARCH INSTRUMENTS

APPENDIX B.1 Critical Thinking Grid (Translated)**Error! Bookmark not defined.**

APPENDIX B.2 Environmental Science Project .. **Error! Bookmark not defined.**

APPENDIX B.3 Environmental Awareness in Daily Life Questionnaire (Translated)..... **Error! Bookmark not defined.**

APPENDIX B.4 Student Learning Satisfaction Questionnaire (Translated). **Error! Bookmark not defined.**

APPENDIX B.5 Observation Sheet..... **Error! Bookmark not defined.**

### APPENDIX C DATA RESULT

APPENDIX C.1 Recapitulation of Students' Environmental Awareness Questionnaire Reliability Test**Error! Bookmark not defined.**

APPENDIX C.2 Recapitulation Of Students' Instagram Learning Satisfaction Questionnaire Reliability Test.. **Error! Bookmark not defined.**

APPENDIX C.3 Recapitulation of Students' Critical Thinking Skill..... **Error! Bookmark not defined.**

APPENDIX C.4 Recapitulation of Students' Environmental Awareness..... **Error! Bookmark not defined.**

APPENDIX C.5 Recapitulation of Students' Environmental Awareness..... **Error! Bookmark not defined.**

### APPENDIX D DOCUMENTATION

APPENDIX D.1 Photo Documentation ..... **Error! Bookmark not defined.**

APPENDIX D.2 Expert Validation Sheet..... **Error! Bookmark not defined.**  
APPENDIX D.3 Review Form..... **Error! Bookmark not defined.**  
APPENDIX D.4 Turnitin Revision ..... **Error! Bookmark not defined.**



## REFERENCES

- Abbott, W., Donaghey, J., Hare, J., & Hopkins, P. (2013). An Instagram is worth a thousand words: An industry panel and audience Q&A. *Library Hi Tech News*, 30(7), 1-6.
- Ahmed, A., & Shafique, I. (2019). Perception of household in regards to water pollution: an empirical evidence from Pakistan. *Environmental Science and Pollution Research*, 1-9.
- Ali, M., Yaacob, R. A. I. B. R., Endut, M. N. A.-A. B., & Langove, N. U. (2016). Strengthening the academic usage of social media: An exploratory study. *Journal of King Saud University-Computer and Information Sciences*.
- Altin, A., Tecer, S., Tecer, L., Altin, S., & Kahraman, B. F. (2014). Environmental awareness level of secondary school students: A case study in Balıkesir (Türkiye). *Procedia-Social and Behavioral Sciences*, 141, 1208-1214.
- Altın, M., Bacanlı, H., & Yıldız, K. (2002). Biyoloji öğretmeni adaylarının çevreye yönelik tutumları. *Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi*, 16-18.
- Anderson, M., & Jiang, J. (2018). Teens, social media & technology 2018. *Pew Research Center*, 31.
- Andrady, A. L. (1994). Assessment of environmental biodegradation of synthetic polymers. *Journal of Macromolecular Science, Part C: Polymer Reviews*, 34(1), 25-76.
- Asur, S., & Huberman, B. A. (2010). *Predicting the future with social media*. Paper presented at the Proceedings of the 2010 IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology-Volume 01.
- Babcock, H. M. (2009). Assuming personal responsibility for improving the environment: Moving toward a new environmental norm. *Harv. Envtl. L. Rev.*, 33, 117.
- Barnes, D. K., Galgani, F., Thompson, R. C., & Barlaz, M. (2009). Accumulation and fragmentation of plastic debris in global environments. *Philosophical*

*Transactions of the Royal Society B: Biological Sciences*, 364(1526), 1985-1998.

Boone, H. N., & Boone, D. A. (2012). Analyzing likert data. *Journal of extension*, 50(2), 1-5.

Britto, A. L., Maiello, A., & Quintslr, S. (2018). Water supply system in the Rio de Janeiro Metropolitan Region: open issues, contradictions, and challenges for water access in an emerging megacity. *Journal of Hydrology*.

Brookhart, S. M. (2010). *How to assess higher-order thinking skills in your classroom*: ASCD.

Carlson, A. E. (2001). Recycling norms. *Calif. L. Rev.*, 89, 1231.

Cetin, G., & Nisanci, S. H. (2010). Enhancing students' environmental awareness. *Procedia-Social and Behavioral Sciences*, 2(2), 1830-1834.

Chawla, L. (1988). Children's concern for the natural environment. *Children's Environments Quarterly*, 13-20.

Cheong, C. M., & Cheung, W. S. (2008). Online discussion and critical thinking skills: A case study in a Singapore secondary school. *Australasian Journal of Educational Technology*, 24(5), 556-573.

Cohen, L., Manion, L., & Morrison, K. (2002). *Research methods in education*: routledge.

*Critical Thinking Testing and Assessment*. Retrieved from criticalthinking.org.

Defebaugh, W. (2018). Millennials Are More Likely to Shop Eco-Friendly, New Study Finds. Retrieved from Be Well website: <https://www.lofficielusa.com/wellness/millennials-more-likely-to-shop-eco-friendly-new-study-finds>

Di, Q., Wang, Y., Zanobetti, A., Wang, Y., Koutrakis, P., Choirat, C., . . . Schwartz, J. D. (2017). Air pollution and mortality in the Medicare population. *New England Journal of Medicine*, 376(26), 2513-2522.

Duță, N., & Martínez-Rivera, O. (2015). Between theory and practice: the importance of ICT in Higher Education as a tool for collaborative learning. *Procedia-Social and Behavioral Sciences*, 180, 1466-1473.

- Ebenstein, A. (2012). The consequences of industrialization: evidence from water pollution and digestive cancers in China. *Review of Economics and Statistics*, 94(1), 186-201.
- Elder, L., & Paul, R. (2010). Critical Thinking: Competency Standards Essential for the Cultivation of Intellectual Skills, Part 1. *Journal of Developmental Education*, 34(2), 38-39.
- Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. *Educational leadership*, 43(2), 44-48.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2011). *How to design and evaluate research in education*: New York: McGraw-Hill Humanities/Social Sciences/Languages.
- Galvani, A. P., Bauch, C. T., Anand, M., Singer, B. H., & Levin, S. A. (2016). Human–environment interactions in population and ecosystem health. *Proceedings of the National Academy of Sciences*, 113(51), 14502-14506.
- Garg, T., Hamilton, S. E., Hochard, J. P., Kresch, E. P., & Talbot, J. (2018). (Not so) Gently down the stream: river pollution and health in Indonesia. *Journal of Environmental Economics and Management*, 92, 35-53.
- Geravandi, S., Takdastan, A., Zallaghi, E., Niri, M. V., Mohammadi, M. J., Saki, H., & Naiemabadi, A. (2015). Noise pollution and health effects. *Jundishapur Journal of Health Sciences*, 7(1).
- Ghadi, I. N., Bakar, K. A., Alwi, N. H., & Talib, O. (2013). Measuring Critical Thinking Skills of Undergraduate Students in Universiti Putra Malaysia. *International Journal of Asian Social Science*, 3(6), 1458-1466.
- Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. (2016). The substitution augmentation modification redefinition (SAMR) model: A critical review and suggestions for its use. *TechTrends*, 60(5), 433-441.
- Hassan, A., Juahir, H., & Jamaludin, N. S. (2009). The level of environmental awareness among students to fulfill the aspiration of national philosophy of education. *American Journal of Scientific Research*, 5, 50-58.
- Hazardous waste management*. (2018). Alabama Department of Environmental Management Retrieved from [adem.alabama.gov](http://adem.alabama.gov).

- Hiramatsu, A., Kurisu, K., & Hanaki, K. (2016). Environmental consciousness in daily activities measured by negative prompts. *Sustainability*, 8(1), 24.
- Hopewell, J., Dvorak, R., & Kosior, E. (2009). Plastics recycling: challenges and opportunities. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1526), 2115-2126.
- Hu, Y., Manikonda, L., & Kambhampati, S. (2014). *What We Instagram: A First Analysis of Instagram Photo Content and User Types*. Paper presented at the Icwsn.
- Inch, E. S. (1989). *Critical Thinking and Communication: The Use of Reason in Argument*, 6/e: Pearson Education India.
- Iyyanki, V., & Muralikrishna, V. (2017). Air pollution control technologies. *Environmental management*, Elsevier, India, 337-397.
- Jude, L. T., Kajura, M. A., & Birevu, M. P. (2014). Adoption of the SAMR model to asses ICT pedagogical adoption: A case of Makerere University. *International Journal of e-Education, e-Business, e-Management and e-Learning*, 4(2), 106.
- Kolokytha, E., Loutrouki, S., Valsamidis, S., & Florou, G. (2015). Social media networks as a learning tool. *Procedia Economics and Finance*, 19, 287-295.
- Kompetensi Inti dan Kompetensi Dasar IPA SMP/MTs* (2017). Kementerian Pendidikan dan Kebudayaan.
- Konting, M., & Norfaryanti, K. *Nor Azirawani, A. Adam and SN Abdullah, 2007. Preliminary assessment of soft skills among students*. Paper presented at the Conference on Learning and Teaching in Education.
- Krishna, I. M., Manickam, V., Shah, A., & Davergave, N. (2017). *Environmental management: science and engineering for industry*: Butterworth-Heinemann.
- Lai, E. R., & Viering, M. (2012). *Assessing 21st Century Skills: Integrating Research Findings*. Pearson.
- Lambin, E. F., Gibbs, H. K., Heilmayr, R., Carlson, K. M., Fleck, L. C., Garrett, R. D., . . . Newton, P. (2018). The role of supply-chain initiatives in reducing deforestation. *Nature Climate Change*, 8(2), 109.



- Larijani, M. (2010). Assessment of environmental awareness among higher primary school teachers. *Journal of Human Ecology*, 31(2), 121-124.
- Lawrence, D., & Vandecar, K. (2015). Effects of tropical deforestation on climate and agriculture. *Nature Climate Change*, 5(1), 27.
- Lee, E., Lee, J.-A., Moon, J. H., & Sung, Y. (2015). Pictures speak louder than words: Motivations for using Instagram. *Cyberpsychology, Behavior, and Social Networking*, 18(9), 552-556.
- Leicester, M. (2009). *Teaching critical thinking skills*: Bloomsbury Publishing.
- Lev, J. (2017). The power of streetscape and how to protect it *Opinion*. Retrieved from <https://www.newcastleherald.com.au/story/4889262/the-power-of-streetscape-and-how-to-protect-it/>
- Liaw, S.-S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & education*, 51(2), 864-873.
- Littlelydyke, M. (2008). Science education for environmental awareness: approaches to integrating cognitive and affective domains. *Environmental Education Research*, 14(1), 1-17.
- Meegan, G. (2015). The Intellectual Standards: The Elements of Thought. Retrieved from <https://theelementsofthought.org/the-intellectual-standards/>
- Mirsal, I. A. (2008). *Soil pollution*: Springer.
- Mishra, P., Koehler, M. J., & Kereluik, K. (2009). Looking back to the future of educational technology. *TechTrends*, 53(5), 49.
- Moghavvemi, S., Sulaiman, A., Jaafar, N. I., & Kasem, N. (2018). Social media as a complementary learning tool for teaching and learning: The case of youtube. *The International Journal of Management Education*, 16(1), 37-42.
- Münzel, T., Schmidt, F. P., Steven, S., Herzog, J., Daiber, A., & Sørensen, M. (2018). Environmental noise and the cardiovascular system. *Journal of the American College of Cardiology*, 71(6), 688-697.
- Naaman, M., Boase, J., & Lai, C.-H. (2010). *Is it really about me?: message content in social awareness streams*. Paper presented at the Proceedings of the 2010 ACM conference on Computer supported cooperative work.

- NCME, N. (1999). Standards for educational and psychological testing. Retrieved from
- Nowak, D. J., & Dwyer, J. F. (2007). Understanding the benefits and costs of urban forest ecosystems *Urban and community forestry in the northeast* (pp. 25-46): Springer.
- Price, P. C., Jhangiani, R., & Chiang, I.-C. A. (2015). *Research methods in psychology*: BCCampus.
- Puentedura, R. (2006). Transformation, technology, and education. *Retrieved February, 18(2013), 504-520.*
- Puentedura, R. (2012). The SAMR model: Six exemplars. *Retrieved August, 14, 2012.*
- Puentedura, R. (2014). Building transformation: An introduction to the SAMR model [Blog post].
- Rainie, L., Brenner, J., & Purcell, K. (2012). Photos and videos as social currency online. *Pew Internet & American Life Project.*
- Ranasinghe, W., & Hemakumara, G. (2018). Spatial modelling of the householders' perception and assessment of the potentiality to improve the urban green coverage in residential areas: A case study from Issadeen Town Matara, Sri Lanka. *Ruhuna Journal of Science, 9(1).*
- Roy, M. (1992). Pollution prevention, organizational culture, and social learning. *Envtl. L., 22, 189.*
- Salkind, N. J. (2010). *Encyclopedia of research design* (Vol. 1): Sage.
- Salomon, D. (2013). Moving on from Facebook: Using Instagram to connect with undergraduates and engage in teaching and learning. *College & Research Libraries News, 74(8), 408-412.*
- Shields, P. M., & Rangarajan, N. (2013). *A playbook for research methods: Integrating conceptual frameworks and project management*: New Forums Press.
- Simsekli, Y. (2015). An implementation to raise environmental awareness of elementary education students. *Procedia-Social and Behavioral Sciences, 191, 222-226.*

- Stella, C. (2005). *Critical thinking skills: developing effective analysis and arguments*: Palgrave Macmillan, New York.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education*, 2, 53.
- Trochim, W. M. (2006). Theory of reliability.
- Vandenbergh, M. P. (2001). The social meaning of environmental command and control. *Va. Envtl. LJ*, 20, 191.
- WHO. (2016). Ambient air pollution: A global assessment of exposure and burden of disease.
- Young, K. (2018). The Rise of Green Consumerism: What do Brands Need to Know? Retrieved from <https://blog.globalwebindex.com/chart-of-the-week/green-consumerism/>