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## A COGNITIVE CONFLICT STRATEGY FOR CONCEPTUAL CHANGE WITH A FOCUS ON MULTIMEDIA LEARNING MATERIAL DEVELOPMENT: A META-ANALYSIS

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### INTRODUCTION

Multimedia materials are now more and more used in curricula. Multimedia learning tool that integrates with text, graphics, audio, video and animation make it more interesting and easier understanding of a concept. It has been used in different ways over the years to support student learning in all branches of education. Diverse teaching strategies adopted when developing multimedia learning material for many different and interesting designs. One of them is to overcome student's misconception. Theoretically, misconception is a spot where student have understood certain concepts in the wrong manner and usually those who are in this situation refuse to switch to the right one (Johnstone, 2000; Driver, 1994). Cognitive Conflicts Strategies are part of psychological theories of conceptual change and it was effective in correcting a misconception as well as improving performance (Arons, 1990; Minstrell, 1989). Once unreliable event is mismatched with the preconceptions that hold by a learner, cognitive conflict will take place. The learner will engage with the learning material and reconstruct their concept to overcome the conflict. There are so many researches related to Cognitive Conflict Strategies in science and mathematics education that has been proven to improve student performance and misconception. Still, a lot of it was implemented through face-to-face classroom instruction. Referable to the growth of multimedia resources like video, thus, Cognitive Conflict Strategy can be believed to be employed when developing multimedia learning material. Even so, what elements of Cognitive Conflict Strategies that should be usable within the video is still an on-going inquiry. This research tries to investigate the elements of Cognitive Conflict Strategies that could be embedded within multimedia learning material that might effectively overcome the students' misconception based on details literature using meta-analysis technique. The following key words were used to search for related publications: misconception in learning, cognitive conflict strategies, conceptual change process and multimedia learning material. Literature was conduct via Science Direct, Web of Science, ProQuest and IEEEExplore Digital Library.

### MAIN RESULT

Based on the meta-analysis, five elements of Cognitive Conflict Strategies were identified as shows in Table 1.

**Table 1.** Elements of Cognitive Conflict Strategies

No	Element of Cognitive Conflict Strategies	Description

1	Meaningful Information	Learning material should have high efficacy for giving clear concept to students (Dahlan & Rohayati, 2012; Hewson, 1992; Sayce, 2009).
		Capable of introducing contradictory information to induce cognitive conflict (Sukjin Kang et.al, 2004 ; Watson, 2002).
2	Challenges student's existing concept	Identify student's current state of knowledge (Dahlan & Rohayati, 2012; Sukjin Kang et.al, 2004).
		Focus on condition that promotes a situation where the existing concept can be explicit (Sukjin Kang et.al, 2004; Tall, 1977).
3	Able to gain attention	Provide situational interest by identifying student's characteristics. (Tall, 1977; Watson, 2002; Sayce, 2009)
4	Motivation	Provide situation which makes students feel curiosity about the topic to motivated learning process (Hewson, 1992; Watson, 2002).
5	Comfortable while using it	Provide the idea that able to bring cognitive conflict become lighter (Hewson, 1992; Sayce, 2009).

In conclusion, the five elements of Cognitive Conflict Strategies as shown in Table 1 should be consider to be applied when developing multimedia learning material in order to overcome the misconception among students.

## REFERENCES

1. Arons, A.B. (1990). A guide to introductory physics teaching. Wiley, New York.
2. Driver, R., Asoko, H., Leach, J., Scott, P., & Mortimer, E. (1994). Constructing scientific knowledge in the classroom. *Educational researcher*, 23(7), 5-12.
3. Johnstone, B. (2000). *Qualitative methods in sociolinguistics* (Vol. 50). New York: Oxford University Press.
4. Minstrell, J. (1989). Teaching science for understanding. In L. B. Resnick & L. E. Klopfer (Eds.), *Toward the thinking curriculum: Current cognitive research* (pp.129-149). Alexandria, VA: Association for Supervision and Curriculum Development.
5. Dahlan, J. A., & Rohayati, A. (n.d.). Implementasi strategi pembelajaran konflik kognitif dalam upaya meningkatkan. *Pendidikan*, 13(2), 65–76.
6. Hewson, P. W. (1992). *CONCEPTUAL CHANGE IN SCIENCE TEACHING AND TEACHER EDUCATION* Peter W. Hewson Madison , Wisconsin , United States of America (pp. 1–15). Spain.
7. Sayce, L. (2009). *The Route to Cognitive Conflict teachers*. (L. Sayce, Ed.) (p. 15). United Kingdom: Reading Borough Council.
8. Sukjin Kang, Lawrence, C. ., & Noh, T. (2004). *Reexamining the Role of Cognitive Conflict in Science Concept Learning*. (L. C. S. and T. N. Sukjin Kang, Ed.) (Vol. 34, pp. 71–96). Netherlands. Reexamining: Kluwer Academic.
9. Tall, D. (1977). Cognitive Conflict and the Learning of Mathematics. In *The International Group for the Psychology of Mathematics Education* (p. 12). Netherlands.
10. Watson, J. M. (2002). INTRODUCTION The importance of cognitive conflict as an influence on learning has long been acknowledged by educators. From the time of Piaget. In J. M. Watson (Ed.), *The Sixth International Conference on Teaching Statistics* (Vol. 12, pp. 1–6). South Africa.