KONTRIBUSI KEMAMPUAN BERPIKIR LOGIS TERHADAP CAPAIAN KETIGA LEVEL REPRESENTASI KIMIA SISWA SMA PADA TOPIK DINAMIKA KIMIA UNTUK TIAP DIMENSI KECERDASAN MAJEMUK

DISERTASI
Diajukan untuk Memenuhi Sebagian Syarat
Memperoleh Gelar Doktor Pendidikan Ilmu Pengetahuan Alam

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ABSTRAK

Penelitian ini bertujuan untuk mengungkap kontribusi kemampuan berpikir logis terhadap capaian hasil belajar siswa di ketiga level representasi kimia pada topik dinamika kimia untuk tiap dimensi kecerdasan majemuk. Data penelitian diperoleh melalui survey menggunakan tiga instrumen, yakni tes kemampuan berpikir logis, *Test of Logical Thinking* (TOLT), inventori kecerdasan majemuk, dan tes capaian hasil belajar siswa di ketiga level representasi kimia pada topik dinamika kimia. TOLT dan inventori kecerdasan majemuk yang digunakan merupakan hasil penerjemahan yang bahasanya telah divalidasi oleh ahli bahasa. Tes capaian ketiga level representasi dibuat peneliti terdiri atas 25 butir soal yang mengandung enam konteks permasalahan dan tiga level representasi untuk setiap konteksnya. Uji validasi tes capaian ketiga level representasi menggunakan metode CVR, melibatkan lima orang ahli, dan menghasilkan nilai CVI sebesar 0,984. Subjek penelitian adalah 205 orang siswa kelas 11 SMA Negeri di Kabupaten Ketapang, Provinsi Kalimantan Hasil penelitian yang diperoleh: (1) Hampir setengah jumlah siswa kelas XI SMA Negeri di Kabupaten Ketapang, provinsi Kalimantan Barat masih berada di tahap konkret. Hanya sebagian kecil yang sudah berada di tahap formal awal dan formal akhir; (2) Frekuensi siswa hampir merata di setiap dimensi kecerdasan majemuk dengan kecerdasan linguistik adalah yang paling banyak; (3) Capaian level representasi yang paling tinggi skor rata-ratanya pada topik dinamika kimia adalah level representasi makroskopik, diikuti oleh simbolik, dan submikroskopik; (4) Kemampuan berpikir logis berkontribusi paling besar terhadap capaian submikroskopik siswa, diikuti oleh capaian simbolik, dan capaian makroskopik; (5) Capaian rata-rata makroskopik dicapai lebih tinggi oleh siswa dengan kecerdasan logika matematik dan visual spasial. Capaian rata-rata submikroskopik dan simbolik dicapai paling tinggi oleh siswa dengan kecerdasan logika matematik; (6) Kecerdasan logika matematik adalah dimensi kecerdasan yang paling mendukung pada tingginya kontribusi kemampuan berpikir logis terhadap capaian submikroskopik. Kecerdasan linguistik adalah dimensi kecerdasan yang paling mendukung pada tingginya kontribusi kemampuan berpikir logis terhadap capaian simbolik. Kecerdasan visual spasial adalah dimensi kecerdasan yang paling mendukung pada tingginya kontribusi kemampuan berpikir logis terhadap capaian makroskopik. Dari elaborasi terhadap temuan pada topik dinamika kimia diperoleh hasil sebagai berikut: Pada subtopik laju reaksi, kontribusi tertinggi kemampuan berpikir logis terhadap capaian makroskopik tidak terjadi pada siswa dengan kecerdasan visual spasial, melainkan pada siswa dengan kecerdasan naturalistik dengan tingkat korelasi pada kategori sedang. Kontribusi tertinggi kemampuan berpikir logis terhadap capaian simbolik tidak terjadi pada siswa dengan kecerdasan linguistik, melainkan pada siswa dengan kecerdasan logika matematik dengan tingkat korelasi pada kategori tinggi; Pada subtopik kesetimbangan kimia, kontribusi tertinggi kemampuan berpikir logis terhadap setiap level representasinya, hasilnya sejalan dengan kontribusi tertinggi kemampuan berpikir logis terhadap ketiga level representasi pada topik dinamika kimia; Kedua subtopik dinamika kimia, tidak menimbulkan perbedaan pada kenyataan bahwa siswa dengan kecerdasan logika matematik memiliki tingkat kontribusi tertinggi pada kemampuan berpikir logis terhadap capaian submikroskopik.

Kata Kunci: Kemampuan berpikir logis, kecerdasan majemuk, representasi makroskopik, representasi submikroskopik, representasi simbolik, topik dinamika kimia

ABSTRACT

This study aims to reveal the contribution of students' logical thinking abilities towards the achievement of chemistry learning outcomes in all three levels of representation on the topic of chemical dynamics based on multiple intelligence dimensions. Research data obtained through survey using three instruments, namely the logical thinking ability test (TOLT), multiple intelligence inventory, and test of chemistry achievement at all three levels of representation on the topic of chemical dynamics. TOLT and multiple intelligence inventory used is the result of a translation whose language has been validated by linguists. The three levels of representation in chemistry achievement test was made by researchers consisting of 25 items containing six context problems and three levels of representation for each context. The validation of the three levels of representation in chemistry achievement test uses the CVR method from Lawshe (1975) involving five experts (Subject Matter Experts), and produces a CVI value of 0.984. The research subjects were 205 of 11th grade students of State High Schools in Ketapang District, West Kalimantan Province. The results of the research obtained are: (1) Nearly half the number of students are still in the concrete stage. Only a small percentage of students are in the rigorous formal and formal stages; (2) The frequency of students is almost evenly distributed in each dimension of multiple intelligences with the most diverse dimensions of intelligence are linguistic intelligence; (3) The highest achievement level of the average score on the topic of chemical dynamics is the macroscopic level of representation, followed by the symbolic, and submicroscopic; (4) The logical thinking ability contributes most to the submicroscopic achievement, followed by symbolic, and macroscopic achievement; (5) Average achievement level of macroscopic representation is achieved higher by students with logical mathematic and visual spatial intelligence. The average achievement level of submicroscopic representation and symbolic representation is achieved highest by students with logical mathematic intelligence; (6) Logical mathematic intelligence is the dimension of intelligence that best supports the high contribution of logical thinking skills towards submicroscopic achievements. Linguistic intelligence is the dimension of intelligence that best supports the high contribution of logical thinking skills towards symbolic achievement. Visual spatial intelligence is the dimension of intelligence that best supports the high contribution of logical thinking skills towards macroscopic achievements. From the elaboration of findings on the topic of chemical dynamics, the following results were obtained: In the reaction rate subtopic, the highest contribution of logical thinking ability towards macroscopic achievement did not occur in students with visual spatial intelligence, but in students with naturalistic intelligence with a correlation level in the medium category. The highest contribution of logical thinking ability to symbolic achievement does not occur in students with linguistic intelligence, but in students with logical mathematic intelligence with a correlation level in the high category; In the chemical equilibrium subtopics, the highest contribution of logical thinking skills towards each levels of representation, the results are in line with the highest contribution of logical thinking ability towards the three levels of representation on the topic of chemical dynamics; Both subtopics of chemical dynamics do not make a difference in the fact that students with logical mathematic intelligence have the highest support to the logical thinking towards submicroscopic achievement.

Key Word: Logical thinking ability, multiple intelligences, macroscopic representation, submicroscopic representations, symbolic representations, chemical dynamic topic.

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