

## RINGKASAN

Penelitian dan pengembangan ini dilatarbelakangi oleh, hasil penelitian yang dilakukan oleh Astuti (2007) menunjukkan masih adanya ketimpangan mutu pendidikan walaupun sekolah yang bersangkutan telah menjadi ujicoba desentralisasi pendidikan. Upaya untuk meningkatkan mutu pendidikan perlu dibuat kebijakan pendidikan yang sesuai dengan tuntutan kebutuhan. Kebijakan itu di antaranya: perlunya melengkapi bahan ajar yang berbasis multi media dan memberikan bekal penguasaan TIK kepada guru agar guru mampu melaksanakan pembelajaran berbasis multimedia (Sujoko,dkk.,2007). Kebijakan perlunya pemanfaatan multimeddia juga dinyatakan oleh Nirwana (2007). Kebijakan lainnya adalah perlunya pelatihan untuk sampai kepada substansi bidang studi. Hal ini mengingat pelatihan yang telah dilakukan, berdasarkan penelitian Dasna dan Umi Dayati (2007), telah memberikan sumbangan terhadap peningkatan kompetensi pedagogis, terutama membuat perangkat kurikulum, tetapi belum sampai pada substansi bidang studi. Matematika sekolah diberikan kepada siswa pendidikan dasar (SMP) untuk membekali siswa berpikir logis, analitis, sistematis, kritis, dan kreatif serta mampu bekerja sama. Sementara itu, penguasaan matematika siswa di Indonesia masih rendah. Hal ini dapat diketahui dari rendahnya prestasi yang dicapai oleh siswa Indonesia yang menduduki peringkat ke 32 dari 38 negara peserta pada tahun 1999 dan peringkat 37 dari 46 negara peserta pada tahun 2003. Salah satu penyebabnya adalah belum efektifnya proses pembelajaran (Sediadi dan Awaludin Tjalla, 2007).

Penelitian dan pengembangan tahun 1 ini, bertujuan menyusun model pembelajaran mata pelajaran matematika di SMP dengan pendekatan *aptitude treatment interaction (ATI)* berbasis portofolio. Secara khusus tujuan penelitian dan pengembangan ini dirinci untuk : (1) mengetahui pembelajaran matematika yang dilaksanakan oleh guru SMP tempat penelitian dan pendekatan yang digunakan oleh guru, (2) menyusun konsep pengembangan materi ajar matematika SMP dengan pendekatan *ATI* berbasis portofolio, dan (3) menyusun konsep pengembangan pembelajaran matematika SMP dengan pendekatan *ATI* berbasis portofolio.

Pengumpulan data dilakukan dengan metode observasi, wawancara, dan FGD. Subjek penelitian adalah guru, siswa, ahli pendidikan, dan pengambil kebijakan. Lokasi penelitian dilakukan di empat SMP negeri dan di empat SMP swasta di Kota Surakarta. Teknik analisis data menggunakan analisis interaktif. Analisis ini dilakukan dalam bentuk siklus dari pengumpulan data, reduksi data, penyajian data, dan penarikan simpulan/verifikasi.

Hasil penelitian dan pengembangan tahun 1, (1) Pembelajaran matematika yang diterapkan di SMP tempat penelitian, meliputi kegiatan perencanaan, pelaksanaan, penilaian, dan pengawasan. Perencanaan, yaitu menyusun program tahunan, program semester, silabus pengembangan dan penilaian, rincian minggu efektif, serta rencana pembelajaran. Di samping itu, guru juga melakukan persiapan dalam hal penguasaan materi pokok bahasan, dan metode mengajar serta alat evaluasi. Pelaksanaan pembelajaran matematika

di SMP tempat penelitian dimulai dari membuka pelajaran, pengembangan pelajaran, dan menutup pelajaran. Kegiatan membuka pelajaran dilakukan dengan menjelaskan pokok bahasan, melakukan apersepsi guna mendorong motivasi, menjelaskan tujuan pembelajaran, serta kadang-kadang diadakan pre test. Adapun kegiatan menjelaskan materi pelajaran dilakukan dengan metode ceramah, tanya jawab, diskusi, drill, dan pendekatan deduktif, dan induktif. Alat peraga dan media walaupun terbatas juga digunakan sesuai dengan materi. Dalam menutup pelajaran guru menyimpulkan materi yang sudah dipelajari dan guru selalu memberi PR dan kadang-kadang post test. Penilaian pembelajaran yang dilakukan di SMP tempat penelitian, yaitu meliputi penilaian proses dan penilaian hasil belajar. Dalam penilaian proses pembelajaran, guru menggunakan tes lisan dan observasi, walaupun penilaian proses ini jarang dilakukan. Penilaian hasil belajar berupa ulangan harian, tugas dari guru, ujian mid semester serta ujian akhir semester. Pengawasan yang dilakukan oleh kepala sekolah di SMP tempat penelitian, telah sesuai dengan kebutuhan, walaupun kadang pelaksanaan supervisi jarang dilakukan. Tetapi setidaknya dalam satu tahun ada supervisi dari kepala sekolah. Semuanya itu tergantung dari hasil belajar siswa. Apabila hasil belajar siswa menurun, kepala sekolah lebih giat lagi dalam supervisi. (2) Prinsip-prinsip pengembangan materi ajar matematika dengan pendekatan *ATI* berbasis portofolio yang menyangkut isi adalah ilmiah, relevan, memadai, aktual dan kontekstual, fleksibel dan menyeluruh. Keilmiahannya mencakup keseluruhan materi dan kegiatan yang menjadi muatan dalam materi ajar matematika. Adapun keseluruhan materi dan kegiatan tersebut harus benar dan dapat dipertanggungjawabkan secara keilmuan. Relevan dimaksudkan cakupan, kedalaman, tingkat kesukaran dan urutan penyajian dalam materi ajar matematika disesuaikan dengan tingkat perkembangan siswa, intelektual, sosial, emosional dan spiritual peserta didik. Materi ajar diharapkan memadai, artinya bahwa materi ajar cukup menunjang pencapaian kompetensi dasar. Dalam sebuah pembelajaran materi ajar harus memuat prinsip aktual dan kontekstual. Prinsip ini mencakup indikator, materi pokok, pengalaman belajar, sumber belajar dan sistem penilaian yang memerhatikan perkembangan ilmu, teknologi, seni mutakhir dalam kehidupan nyata. Pengembangan bahan ajar ini juga harus fleksibel disesuaikan dengan perkembangan fenomena yang terjadi dalam kehidupan sehari-hari. Pengembangan materi ajar yang disampaikan oleh guru kepada siswa harus dapat menunjang pencapaian skill dan sikap. Hal ini dibuktikan oleh pembelajaran matematika dituntut untuk selalu berpikir logis, kritis dan terstruktur. Materi ajar yang diharapkan haruslah menyeluruh, artinya bahwa komponen materi ajar mencakup keseluruhan ranah kognitif, ranah afektif dan psikomotorik. Prinsip-prinsip pengembangan materi ajar yang menyangkut tata urutan adalah sistematis dan konsisten. Dalam pengembangan materi ajar, ada baiknya guru matematika selalu menggunakan topik bab awal sebagai dasar topik pembelajaran selanjutnya. Hal ini dilakukan jika topik antarbab awal dengan bab selanjutnya saling berkesinambungan. Kejelasan antara standar kompetensi dan kompetensi dasar sangat diperlukan dalam pengembangan materi bahan ajar. (3) Pengembangan pembelajaran matematika dengan

pendekatan *ATI* berbasis portofolio untuk optimalisasi perubahan perilaku yang positif dan prestasi akademik siswa, kegiatan pembelajarannya dibagi menjadi tiga bagian, yaitu tahap pendahuluan, tahap kegiatan inti, dan tahap kegiatan penutup. Ketiga tahapan tersebut akan diwujudkan dalam bentuk beragam kegiatan sesuai dengan model klasikal, kelompok, dan individu secara siklus dan dapat dimulai dari klasikal, kelompok, atau individu sesuai kebutuhan. Tim belajar kelompok kecil dengan anggota lima siswa dengan kemampuan awal berbeda (1 tinggi, 2 sedang, dan 1 rendah) dan dibentuk setiap tatap muka pembelajaran. Kegiatan pendahuluan meliputi 1) review, yaitu membahas tugas mandiri, tugas mandiri yang esensial dan sulit diberi balikan, 2) motivasi awal, yaitu memberitahukan tujuan pembelajaran, memberikan gambaran umum materi ajar dan memberikan gambaran kegiatan yang akan dilakukan, dan 3) apersepsi, yaitu memberikan materi pengait sesuai materi yang dibahas. Kegiatan inti meliputi pengembangan konsep dan penerapan. Dalam pengembangan konsep meliputi penyampaian materi ajar, menggunakan alat atau media pembelajaran, mengadakan variasi pembelajaran dengan cara a) menampilkan sikap bersahabat, b) menghindari perbuatan yang dapat mengganggu perasaan siswa, c) menunjukkan sikap adil kepada semua siswa, d) menggunakan berbagai teknik untuk memelihara tingkah laku siswa, e) menghargai setiap perbedaan pendapat, f) menekankan bagian-bagian penting, g) membantu siswa yang mendapat kesulitan, h) mendorong siswa menumbuhkan kepercayaan, menciptakan suasana secara aktif dengan cara a) menyajikan pertanyaan atau tugas selama pengembangan, b) mendorong siswa menyampaikan idenya, c) mendorong siswa terjadinya tukar pendapat antara siswa dengan guru, penguatan dengan cara a) memberikan penguatan terhadap tingkah laku siswa yang baik, b) memberikan semangat kepada siswa yang belum berhasil, c) penguatan bervariasi diberikan secara wajar dan diberikan pada waktu yang tepat. Dalam penerapan diberikan latihan terkontrol dan latihan mandiri. Latihan terkontrol stting kelas kelompok dengan tutor sebaya, meliputi kegiatan : a) tugas diarahkan dengan jelas, b) membimbing dan memudahkan belajar siswa, c) menuntut tanggung jawab siswa, d) menumbuhkan kerjasama antar siswa, dan e) menumbuhkan inisiatif siswa dalam belajar. Latihan mandiri meliputi kegiatan: a) komunikasi antar pribadi menunjukkan kehangatan, b) merespon setiap pendapat siswa, c) membimbing belajar siswa, d) mendorong siswa untuk banyak berkreasi dalam belajar dan e) menumbuhkan kepercayaan siswa kepada diri sendiri. Kegiatan penutup meliputi review guru terhadap rangkuman dan tindak lanjut. Untuk review guru terhadap rangkuman, yaitu a) mengarahkan siswa untuk membuat rangkuman dan b) rangkuman jelas dan mencakup seluruh inti materi ajar. Sedangkan sebagai kegiatan tindak lanjut, yaitu a) mengevaluasi kemampuan siswa, b) menyarankan agar materi ajar dipelajari kembali di rumah, dan c) memberikan tugas rumah mandiri dengan petunjuk yang jelas

## SUMMARY

These research and development are based on the research result that is performed by Astuti (2007). This research shows that there is still a gap of education quality although the school has become the test of education decentralization. The effort to develop education quality need to make an education policy in accordance with the need of demand. The policies are: need to complete learning material that is based on multimedia and to give TIK skill capability to the teacher, so the teacher is able to do a learning based on multimedia (*Sujoko, dkk, 2007*). The policy about the using of multimedia is also stated by Nirwana (2007). The other policy is about the need of training toward field substance. It connects with the Dasna and Umi Dayati research that has given contribution toward the development of pedagogic competence, particularly in making of curriculum, however, it has not ran to the field substance yet. Mathematic in school is given to the Junior High School students in order they can think logically, analytically, systematically, critically and creatively and can cooperate. Meanwhile, the student mathematic capability in Indonesia is still low. It can be known from the low of the Indonesian's student achievement that placed in 32<sup>nd</sup> rank of 38 participant's countries in year 1999 and placed in 37<sup>th</sup> rank of 46 participant's countries in year 2003. One of the causes is the learning process isn't effective yet. (Sediadi and Awaludin Tjalla, 2007).

These research and development in the first year are to arrange the learning model of mathematic subject in Junior High School with aptitude treatment interaction (ATI) way based on portfolio. Particularly, the research and development objectives are: (1) to know mathematic learning performed by Junior High School teacher and the location of the research and the way used by the teacher., (2) to arrange concept of mathematic learning material in Junior High School with ATI based on portfolio, and to arrange concept of mathematic learning development in Junior High School with ATI based on portfolio.

Data collection is performed by using observation method, interview, and FGD. The research subjects are teacher, student, education expert and policy maker. The research location is performed in four government Junior High Schools and in four private Junior High Schools in Surakarta City. The data analysis uses interactive analysis. This analysis is performed in cycle form of the data collection, data reduction, data served, and taking the conclusion/verification.

The research and development result in the first year: (1) Mathematic learning that is implemented in Junior High School where the research location is performed including: Activity of planning, implementation, evaluation, and supervision. Planning, that is to arrange annual program, semester program, development and evaluation syllabus, effective weekly detail, and learning planning. Besides, the teacher also performs preparing of main learning capability, and learning method and tool evaluation. The mathematic learning implementation in Junior High School where is the research location started from opening the lesson, lesson development, and closing the lesson. The activities in lesson opening are performed by explaining the main material, performing apperception in order to motivate, to explain the learning objective and sometime

there is a pre-test. The activities in learning material explaining are performed by using speech method, question and answer, discussion, drill and deductive and inductive ways. Even though the practice and media instrument are limited, its also used as the material. In closing the material, the teacher concludes the material that has been learnt and the teacher always gives the homework and sometime gives posttest. Learning evaluations that is performed in Junior High School where is the research located are included process evaluation and learning result evaluation. In learning process evaluation, the teacher uses observation and oral test, even though this evaluation process is rarely used. Learning result evaluations are daily test, task from the teacher, semester mid-test and final semester test. The supervision is performed by principal in Junior High School where is the research located has agreed with the need, even though sometime the supervision implementation is rarely performed. But, at least in one year there is a supervision from the principal. All of them depend on student result learning. If the student result learning decreases, the principal must active in supervising the student. (2) Mathematic learning development principles with ATI way based on portfolio consists of scientific, relevance, suffice, actual and contextual, flexible and complete. Scientific consists of a whole activity and material. Those whole activity and material must correct and it can be responsible scientifically. Relevant consists of scoop, depth, level of difficulty and series of serving in mathematic teaching material in accordance with level of development student, intellectual, social, emotional and spiritual of student participant. Hopefully, teaching material is sufficient, it means that teaching material is enough to increase the achievement of basic competence. In a teaching material must contain actual and conceptual principle. This principle consists of indicator, main material, experience of study, source of study and evaluation system that pay attention at scientific development, technology, state of art in a real life. This development of teaching material also must flexible in accordance with phenomenon development happened in daily activity life. The development of teaching material that is given by the teacher to the student must support the skill and attitude achievement. It is proven by mathematic learning that must always think logically, critically and structurally. Hopefully, the learning material must cover the situation; it means that the teaching material component includes a whole of cognitive field, affective and psychomotor field. The material development principles that connect the series of order are systematically and consistently. In the development of teaching material, it will be better if the mathematic teacher always use the introduction chapter as a basic to the next chapter. It will be done if the topic between introduction chapter and the next chapter are connected. The steady between competence standard and basic competence is very important need in developing teaching material. (3) Mathematic learning development with ATI way based on portfolio to maximize the positive attitude changing and student academic achievement. The learning activity is divided into three stages: introduction stage, main activity stage, and closing stage activity. The three of these stages will be performed in various activities in accordance with classical model, group, and individual cycle and it can be started from classical, group, or individual depends on need. The team of small group study with five students with the different ability (1 high, 2 medium,

low) and are formed in every meeting of learning. Introduction activity includes 1) review, that is, discuss the independent task, essential and difficult independent task, 2) beginning motivation, that is, to inform objective learning, to give the general of teaching material and to give the description of activity that will be performed, and 3) apperception, that is, to give the hook in accordance with the material will be discussed. The main activity includes application and concept development. In concept development includes teaching material presentation, to use tool and media learning, to organize learning variation with a) to show friendly attitude, b) to avoid the attitude that can bother student's feeling, c) to show fair attitude to all of the students, d) to use various technique to maintain student's behavior, e) to appreciate every different opinion, f) to make sure the important thing, g) to help students who are in trouble, h) to motivate student in improving trust, to create the active situation with a) serve the question or task during the development, b) to motivate student presenting his idea, c) to motivate student in making discussion between the student and the teacher, strength ness with a) to give the strength toward the good behavior student, b) to give spirit toward the student who failed, c) variation strength ness is given properly and given in the right time. To give controlled and independent practice in its application. Controlled practice in group class with the peer tutor includes: a) task is directed clearly, b) to guide and make the study easy for the student, c) to ask the responsible student, d) to grow the cooperation between the students, and e) to grow the student initiative in studying. Independent practice includes some activities: a) communication between personal showing warmth, b) to respond every student's opinion, c) to guide student's learning, d) to motivate student to make more creation in studying and e) to grow the student's confident. Closing activity includes teacher review toward summary and the next action. To teacher's review toward summary: a) to direct the student to make summary and b) clearly summary and include a whole of main teaching material. Meanwhile as the next action: to evaluate the student's ability, b) to suggest that the teaching material should be learnt again at home, and c) to give independent homework with the clearly guidance.