Teaching Learning Resources For International Standard of Schooling

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OLEH
Dr. Marsigit, MA
Universitas Negeri Yogyakarta

Website: http://powermathematics.blogspot.com
Hermeneutics of SBI theory

empirical evidence
Will
Attitude
Knowledge
Skill
Experience

Institutional Supports
(Dept, Faculty, Univ.)

Empirical Evidences


National/International Cooperation/Networking

Facilities, ICT, Research, Budget, Staff, Resources,

Improved Student Participation and Achievement

International Standards
<table>
<thead>
<tr>
<th></th>
<th>Industrial Trainer</th>
<th>Technological Pragmatist</th>
<th>Old Humanist</th>
<th>Progressive Educator</th>
<th>Public Educator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Politics</strong></td>
<td>Radical right</td>
<td>Conservative/ liberal</td>
<td>Liberal</td>
<td>Democracy</td>
<td></td>
</tr>
<tr>
<td><strong>Mathematics</strong></td>
<td>Body of Knowledge</td>
<td>Science of truth</td>
<td>Structure of truth</td>
<td>Process of Thinking</td>
<td>Social Activi- ties</td>
</tr>
<tr>
<td><strong>Moral Value</strong></td>
<td>Good vs Bad</td>
<td>Pragmatism</td>
<td>Hierarchies Paternalistics</td>
<td>Humanity</td>
<td>Justice, Freedom</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Theory of Society</strong></td>
<td>Hierarchy, Market Orientation</td>
<td>Hierarchy</td>
<td>Hierarchy</td>
<td>Well-fare</td>
<td>Un-justice need a reform</td>
</tr>
<tr>
<td><strong>Genesis of Students</strong></td>
<td>Empty Vessel</td>
<td>Empty Vessel</td>
<td>Character Building</td>
<td>Student Orientation</td>
<td>To develop/grow seed plant</td>
</tr>
<tr>
<td><strong>Theory of Students’ Ability</strong></td>
<td>Talent and Effort</td>
<td>Talent</td>
<td>Talent Development</td>
<td>Need</td>
<td>Aspect of culture, Relatives</td>
</tr>
<tr>
<td>Aim of Mathematics Education</td>
<td>Industrial Trainer</td>
<td>Technological Pragmatist</td>
<td>Old Humanist</td>
<td>Progressive Educator</td>
<td>Public Educator</td>
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<tr>
<td>Back to Basic (Arithmetics)</td>
<td>Certification</td>
<td>Transfer of knowledge</td>
<td>Creativity</td>
<td>To develop people comprehensively through math.</td>
<td></td>
</tr>
<tr>
<td>Theory of Learning</td>
<td>Work Hard, Exercises, Drill, Memorize</td>
<td>Thinking and practice</td>
<td>Understanding and Application</td>
<td>Exploration</td>
<td>Discussion, Autonomy, Self,</td>
</tr>
<tr>
<td>Theory Of Teaching</td>
<td>Transfer of knowledge (transmission)</td>
<td>External Motivation</td>
<td>Expository</td>
<td>Construction, Development</td>
<td>Discussion, Investigation</td>
</tr>
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<tr>
<td><strong>Resources</strong></td>
<td>White Board, Chalk, Anti Calculator</td>
<td>Teaching Aid</td>
<td>Visual Teaching Aid for motivation</td>
<td>Various resources/environment</td>
<td>Social Environment</td>
</tr>
<tr>
<td><strong>Evaluation</strong></td>
<td>External Test</td>
<td>External Test</td>
<td>External Test</td>
<td>Porto-folio, Assessment</td>
<td>Porto folio, Social Context</td>
</tr>
<tr>
<td><strong>Diversity</strong></td>
<td>Monoculture</td>
<td>Desentralisation</td>
<td>Competent Based Curricu-lum</td>
<td>Multiple Solution, Local Culture</td>
<td>Heterogonomous</td>
</tr>
</tbody>
</table>
HAKEKAT MATEMATIKA SEKOLAH
(Ebut And Straker, 1996)

MATEMATIKA ADALAH ILMU TENTANG POLA DAN HUBUNGAN
MATEMATIKA ADALAH KEGIATAN PROBLEM SOLVING
MATEMATIKA ADALAH KEGIATAN INVESTIGASI
MATEMATIKA ADALAH ALAT KOMUNIKASI
<table>
<thead>
<tr>
<th>Instrumental Curriculum</th>
<th>Interactive Curriculum</th>
<th>Individualistic Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packages (subj. discipline)</td>
<td>Problems (interdiscip. enquiry)</td>
<td>Personal eksploration</td>
</tr>
<tr>
<td>Berorientasi Kerja</td>
<td>Kesejahteraan Masy</td>
<td>Kebahagiaan Hidup</td>
</tr>
<tr>
<td>Materi sangat terstruktur</td>
<td>Struktur materi longgar</td>
<td>Materi tak terstruktur</td>
</tr>
<tr>
<td>Guru Mendominasi</td>
<td>Guru sbg Manager</td>
<td>Guru melayani kebut belaj siswa</td>
</tr>
<tr>
<td>Teachers as passive recipients</td>
<td>Teacher as represent. Participants</td>
<td>Teacher as developers</td>
</tr>
<tr>
<td>Attain. of specif. goal</td>
<td>Anthropological studies</td>
<td>Indiv. case-histories</td>
</tr>
<tr>
<td>MANUSIA DAPAT DIREKAYASA</td>
<td>MANUSIA SBG MAKHLUK SOSIAL</td>
<td>MANUSIA SEBAGAI PRIBADI MAHKUH</td>
</tr>
<tr>
<td>DUNIA NYATA</td>
<td>DUNIA YANG BERUBAH</td>
<td>DUNIA YANG TIDAK DIKETAHUI</td>
</tr>
</tbody>
</table>
Karakteristik Sekolah Berstandard Internasional

Sumber: http://www.satriadharma.wordpress.com
Akreditasi tambahan dari badan akreditasi sekolah BAN-Sekolah dan negara anggota OECD dan/atau negara maju lainnya yang mempunyai keunggulan tertentu dalam bidang pendidikan.
<table>
<thead>
<tr>
<th>Kurikulum (Standar Isi) dan Standar Kompetensi lulusan</th>
<th>Menerapkan KTSP Sekolah telah menerapkan system administrasi akademik berbasis teknologi Informasi dan Komunikasi (TIK) dimana setiap siswa dapat meng-akses transkipnya masing-masing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memenuhi Standar Isi Muatan pelajaran (isis) dalam kurikulum telah setara atau lebih tinggi dari muatan pelajaran yang sama pada sekolah unggul dari salah satu negara diantara 30 negara anggota OECD dan/atau dari negara maju lainnya.</td>
<td></td>
</tr>
<tr>
<td>Memenuhi SKL Penerapan standar kelulusan yang setara atau lebih tinggi dari SNP Meraih mendali tingkat internasional pada berbagai kompetensi sains, matematika, teknologi, seni, dan olahraga.</td>
<td></td>
</tr>
</tbody>
</table>
III Proses Memenuhi Proses pembelajaran pada semua mata pelajaran telah menjadi teladan atau rujukan bagi sekolah lainnya dalam pengembangan akhlak mulia, budi pekerti luhur, kepribadian unggul, kepemimpinan, jiwa kewirausahaan, jiwa patriot, dan jiwa inovator

- Proses pembelajaran telah diperkaya dengan model-model proses pembelajaran sekolah unggul dari salah satu negara di antara 30 negara anggota OECD dan/atau negara maju lainnya.

- Penerapan proses pembelajaran berbasis TIK pada semua mapel

- Pembelajaran pada mapel IPA, Matematika, dan lainnya dengan bahasa Inggris, kecuali mapel bahasa Indonesia.
IV Penilaian Memenuhi Standar Penilaian

Sistem/model penilaian telah diperkaya dengan system/model penilaian dari sekolah unggul di salah satu negara di antara 30 negara anggota OECD dan/atau negara maju lainnya.
V Pendi Memenuhi Standar Pen-didik

1. Guru sains, matematika, dan teknologi mampu mengajar dengan bahasa Inggris
   - Semua guru mampu memfasilitasi pembelajaran berbasis TIK
   - Minimal 20% guru berpendidikan S2/S3 dari perguruan tinggi yang program studinya terakreditasi A
VI. Tenaga Memenuhi Standar Tenaga Kependidikan

- Kepala sekolah berpendidikan minimal S2 dari perguruan tinggi yang program studinya terakreditasi A
- Kepala sekolah telah menempuh pelatihan kepala sekolah yang diakui oleh Pemerintah
- Kepala sekolah mampu berbahasa Inggris secara aktif
- Kepala sekolah memiliki visi internasional, mampu membangun jejaring internasional, memiliki kompetensi manajerial, serta jiwa kepemimpinan dan enterprenual yang kuat
V Sara Memenuhii
II na uhi Pras  Standar a Sarana .
• Setiap ruang kelas dilengkapi sarana pembelajaran berbasis TIK
• Sarana perpustakaan TELAH dilengkapi dengan sarana digital yang memberikan akses ke sumber pembelajaran berbasis TIK di seluruh dunia.
• Dilengkapi dengan ruang multi media, ruang unjuk seni budaya, fasilitasolah raga, klinik, dan lain-lain.
VIII Pengelola Memenuhi I Standar Penge- lolaan


- Merupakan sekolah multi kultural
- Sekolah telah menjalin hubungan “sister school” dengan sekolah bertaraf/berstandar internasional diluar negeri
- Sekolah terbebas dari rokok, narkoba, kekerasan, kriminal, pelecehan seksual, dan lain-lain
- Sekolah menerapkan prinsip kesetaraan gender dalam semua aspek pengelolaan sekolah
A CRITICAL LOOK AT

*International Level of MATHEMATICS EDUCATION*
Empirical Evidences on Students’ Learn Mathematics
Third International Mathematics and Science Study (TIMSS, 1995)

- Elaborate international comparison of mathematics and science education
- Large amount of data, unusually careful methodology
- Comparison of student performance, teacher preparation, textbooks, teaching styles

Wilfried Schmid, 2009
Conclusions drawn from TIMSS: US student performance

- Relative performance declines drastically in later grades
- Students do relatively well on one-step problems, but not well on multi-step problems
- Students do relatively well on “data analysis” problems
- Students do badly on problems requiring conceptual thinking

Wilfried Schmid, 2009
Implication to
Method and Model of
TEACHING LEARNING PROCESSES
The learner experiences an activating event, one that exposes the difference between what they thought they knew and what is actually happening. Earlier versions of this theory identified this as a single event, later work has noted that “several events may converge to start the process”

(Baumgartner, 2001, p. 19 in Patricia Cranton, 2002)
The learner then begins to “articulate assumptions” about their current mental models and how this new information fits with their currently thinking.
The learner then begins to investigate alternative viewpoints.
The learner then engages others in discussion about both previously held assumptions and new information learned during their search for facts and ideas.
The learner revises his or her assumptions to make them fit better with new situation.
The learner begins to put the new assumptions into practice.
PCMI (Park City Mathematics Institute) Model of Professional Development

• Continue to learn and do mathematics
• Analyze and refine classroom practice
• Become a resource to colleagues and the profession
PCMI professional development is research based----

• is grounded in mathematics content
• has students’ learning as the ultimate goal
• is centered on what teachers do in their practice
• encourages teacher collaboration
• draws on outside expertise
• makes use of teacher knowledge and expertise
• is sustained, coherent and continues over teacher’s entire career

National Council of Teachers of Mathematics (NCTM)

- Professional organization of mathematics teachers
- Many teachers are required to become members and to pay dues
- Relatively inactive until the eighties, now very active
- In recent years, most leaders of the organization have been mathematics educators, not teachers

Wilfried Schmid, 2009
NCTM 1989 Curriculum Guidelines

• Elaborate document, written by a large committee of mathematics educators and teachers

• Promoted by supporters as de-facto national mathematics curriculum guidelines

• Includes social agenda: make mathematics likable and approachable, involve boys and girls equally, address needs of disadvantaged students

Wilfried Schmid, 2009
After NCTM 1989 guidelines

Reformers demand:
- develop students’ “mathematical thinking”
- less emphasis on paper-and-pencil computations
- use calculators at all times
- much less memorization
- reduce or eliminate direct instruction
- emphasize “group learning” and “discovery learning”

Wilfried Schmid, 2009
Quotes from TERC manuals

In old-style class, students:
• worked alone
• focused on getting the right answer
• recorded by only writing down numbers
• used a single prescribed procedure for each type of problem
• used only pencil and paper, chalk and chalkboards as tools

In new-style class, students:
• work in a variety of groupings
• consider their own reasoning and the reasoning of other students
• communicate about mathematics orally, in writing, and by using pictures, diagrams and models
• use more than one strategy to double-check
• use cubes, blocks, measuring tools, calculators, and a large variety of other materials

Wilfried Schmid, 2009
Quotes from TERC manuals

The teacher’s role is:

• to observe and listen carefully to students
• to try to understand how students are thinking
• to help students articulate their thinking, both orally and in writing
• to establish a classroom atmosphere in which high value is placed on thinking hard about a problem
• to ask questions that push students’ mathematical thinking further
• to facilitate class discussion about important mathematical ideas

Wilfried Schmid, 2009
Ingredients of a good mathematics education

• Well-trained teachers
• Balance between computational practice, problem solving, and conceptual understanding
• Sensible balance between direct instruction and “discovery learning”
• Good textbooks
• Addressing the needs of students with various degrees of mathematical competences

Wilfried Schmid, 2009
Recommendation for Developing Mathematics Teaching

1. Ask for professional experiences from experiences colleagues
2. Change activities often
   Research currently shows the attention span of a typical adult to be 15-20 minutes at best
3. Tap into the technological savvy and interest of Millennials
4. Assign group roles for the first few team projects
5. Work to foster a team environment
   Consider the use of formal groups with clearly defined roles that are rotated throughout the group
Recommendation for Developing Mathematics Teaching

6. Enforce individual accountability for group projects
7. Require participation in some form each class period
8. Find the right mix of guidance, structure, and visibility for all groups
9. Encourage discussion between the groups
10. Recognize excellent performers individually
11. Give individual work in addition to group work
Knowledge of Mathematics for Teaching

- Not everything a teacher needs to know ends up on the chalkboard.
  — Mark Saul

- The ability “to think deeply about simple things” (A. Ross)
  What’s really behind the geometry of multiplying complex numbers?

- The ability to create activities that uncover central habits of mind
  What do $5^{3/2}$ and $5^{1/2}$ mean?
Knowledge of Mathematics for Teaching (cont’d)

- The ability to see underlying connections and themes

  - Connections
    - Linear Algebra brings coherence to secondary geometry
    - Number Theory sheds light on what otherwise seem like curiosities in arithmetic
    - Abstract Algebra provides the tools needed to transition from arithmetic with integers to arithmetic in other systems.
    - Analysis provides a framework for separating the substance from the clutter in precalculus
    - Mathematical Statistics has the potential for helping teachers integrate statistics and data analysis into the rest of their program
Knowledge of Mathematics for Teaching (cont’d)

- The ability to see underlying connections and themes

  - Themes
    - Algebra: extension, representation, decomposition
    - Analysis: extension by continuity, completion
    - Number Theory: reduction, localization
Mathematical competencies (PISA)

C1. Mathematical thinking skill
C2. Mathematical argumentation skill
C3. Modelling skill
C4. Problem posing and solving skill
C5. Representation skill
C6. Symbolic, formal and technical skill
C7. Communication skill
C8. Aids and tools skill
Horizontal mathematisation (Treffers, 1986). It requires activities such as:

– identifying the specific mathematics in a general context
– schematising
– formulating and visualising a problem
– discovering relationships and regularities
– recognising similarities between different problems (de Lange, 1987)
Vertical mathematisation and can be recognised in the following activities:

– representing a relationship by means of a formula
– proving regularities
– refining and adjusting models
– combining and integrating models
– generalising
How can we develop students' centered leaning?

Pedagogical Knowledge

Lesson Study
For Developing
Classroom
Communication

Content Knowledge

Developing Pedagogical Content Knowledge

Plan → Research Lesson → Reflection
Open Source Lesson Study

http://hrd.apecwiki.org/index.php/Main_Page
Presentasi ini didukung Pemutaran Video Clip untuk mereview tentang:

- RPP
- Silabus
- Teaching Learning method
- LKS
- Dsb.
TERIMAKASIH