EVALUASI, PENGUKURAN, TES, PENILAIAN (ASESMEN), dan PENILAIAN KELAS

EVALUASI :
Kegiatan identifikasi untuk melihat apakah suatu program yang telah direncanakan telah tercapai atau belum, berharga atau tidak, dan dapat pula untuk melihat tingkat efisiensi pelaksanaannya. Evaluasi berhubungan dengan keputusan nilai (value judgement).

PENGUKURAN (MEASUREMENT)
Proses pemberian angka atau usaha memperoleh deskripsi numerik dari suatu tingkatan dimana seorang siswa telah mencapai karakteristik tertentu. Hasil Pengukuran berhubungan dengan proses pencarian atau penetuan nilai kuantitatif.

TES:
Cara penilaian yang dirancang dan dilaksanakan kepada siswa pada waktu dan tempat tertentu serta dalam kondisi yang memenuhi syarat-syarat tertentu yang jelas.

PENILAIAN (ASESMEN)

- Asesmen adalah proses mengumpulkan informasi dan membuat keputusan berdasarkan informasi itu
  (Blaustein, D. et.al ,1999)

- Proses sistematik meliputi pengumpulan dan penafsiran data hasil belajar sebagai dasar membuat keputusan tentang siswa.

PENILAIAN KELAS

- Proses Pengumpulan dan penggunaan informasi oleh guru untuk pemberian nilai terhadap hasil belajar siswa berdasarkan tahapan kemajuan belajarnya sehingga didapatkan potret/ profil kemampuan siswa sesuai dengan daftar kompetensi yang ditetapkan dalam kurikulum.
- Penilaian kelas dilaksnakan secara terpadu dalam proses pembelajaran di kelas
- Penilaian kelas dilaksnakan baik secara formal dan non formal, di dalam maupun di luar kelas, terintegrasi dengan pembelajaran atau dilakukan pada waktu khusus.

Beberapa cara melakukan penilaian kelas:

- tes tertulis (paper and pencil test)
- penilaian hasil kerja siswa melalui kumpulan hasil kerja (portofolio)
- penilaian produk 3 dimensi
- penilaian unjuk kerja (performance test)

Tujuan Penilaian

Usaha memberikan gambaran tentang perkembangan hasil belajar siswa untuk memperbaiki proses pembelajaran yang harus dilakukan juga digunakan sebagai pengakuan terhadap kualitas pendidikan yang telah dicapai disekolah tersebut.

Ruang Lingkup Penilaian:

A. penilaian Eksternal

Untuk memperoleh pengakuan terhadap kualitas pendidikan di sekolah tersebut dengan standar yang telah ditentukan:

(1). Standar Internasional
apakah lulusannya dapat pengakuan di mancanegara?

(2). Standar Nasional:
Apakah lulusannya telah memenuhi standar nasional?
Apakah lulusannya layak memasuki Jenjang pendidikan yang lebih tinggi di Indonesia?

(3). Standar Lokal
Apakah lulusannya telah mencapai target daerah setempat?

B. Penilaian Internal

Penialain hasil belajar siswa yang dilakukan guru di sekolah sesuai dengan kompetensi yang telah ditetapkan.

Pendekatan dalam Penilaian

A. Penilaian Acuan Norma (Norm Reference Assessment)
Penilaian siswa dikaitkan dengan hasil penilaian seluruh siswa yang dilakukan dengan alat yang sama.

B. Penilaian Acuan Kriteria (Criterion –Referrence Assessment)
Hasil penilaian terhadap siswa mengacu pada patokan.

Karakteristik Penilaian Kelas

- Berkesinambungan/kontinu
- Komprehensif
- Berbasis kelas
- Objektif
- Valid
- Mendidik
- Terbuka

3 DOMAIN BELAJAR (Bloom, 1956)

Domain Kognitif

Domain kognitif mencakup pengetahuan konten dan perkembangan keterampilan intelektual. Domain ini meliputi: ingatan atau pengetahuan tentang fakta-fakta, konsep-konsep yang menjadi dasar untuk mengembangkan kemampuan dan keterampilan intelektual.

Domain Afektif

Domain afektif mencakup Perasaan (feelings), nilai-nilai (values), apresiasi (appreciation), antusiasme (enthusiasms), motivasi (motivations), dan sikap (attitude).

Domain Psikomotor

Domain Psikomotor mencakup : Gerakan Fisik (Physical Movement), Koordinasi (coordination), dan keterampilan motorik.
Perkembangan keterampilan ini memerlukan latihan dan pengukurannya mencakup: kecepatan, presisi, prosedur atau teknik.

DOMAIN KOGNITIF

No	Jenjang	Deskripsi	Contoh Kata kerja Operasional
1	Pengetahuan (Knowledge)	Kemampuan mengingat informasi yang telah dipelajari.	mendefinisikan, mendeskripsikan, membilang, mengidentifikasi, memberi label, mendaftar, menjodohkan, menamai, membaca, merekam, memproduksi, memilih , menyatakan
2	Pemahaman (Comprehension)	Kemampuan memahami makna informasi	mengklasifikasi, mendeskripsikan , mendiskusikan , menaksir , menjelaskan , menggeneralisasi, memberi contoh , menyatakan kembali dengan kata-kata sendiri, mengungkapkan, meringkas.
3	Aplikasi (Aplication)	Menggunakan informasi yang telah dipelajari dalam situasi baru dan nyata untuk memecahkan permasalahan yang memiliki jawaban tunggal dan terbaik.	melakukan , mengadministrasikan, mengartikualsi, menilai, membuat carta,mengumpulkan,menghitung, mengkostruksi, mengkontribusikan, mengontrol, menentukan. mengembangkan, menemukan, membangun, memperluas, mengimplementasikan, mencakup, menginformasikan, menginstruksikan, mengoperasionalkan, berpartisipasi, meramalkan, menyiapkan, menyiapkan, memproduksi, membuat proyek, menyedialkan, menghubungkan, melaporkan, menunjukkan, memecahkan, mengajarkan, mentransfer, menggunakan, memanfatkan.
4	Analisis (Analysis)	Kemampuan memilah-milah informasi ke dalam bagian-bagian, menguji (dan mencoba untuk memahami struktur organosasi) informasi tersebut untuk mengembangkan kesimpulan yang divergen melalui pengdentifikasian motivasi dan penyebab, membuat kesimpulan, dan atau menemukan bukti-bukti yang mendukung generasisasi.	memilah, mengkorelasikan, membuat diagram, mendiferensiasikan, mendiskriminasikan, membedakan, memfokuskan, mengilustrasikan, menyimpulkan, membatasi, membuat garis besar, menunjukkan, memprioritaskan, mengakui, memisahkan, membagi.

5	Sintesis (Synthesis)	Menggunakan pengetahuan dan keterampilan terdahulu secara kreatif dan divergen untuk menghasilkan keseluruhan yang baru dan orisinil.	mengadaptasi, mengantisipasi , mengkategorisasi, mengkombinasikan, mengkomunikasikan,membandingkan, mengkompilasi, mengkomposisikan , mengkontraskan , mengkreasikan , merancang membagi,mengekspresikan , memfasilitasikan , memformulasikan , membangkitkan , mengintegrasikan , memodelkan, memodifikasi, menegosiasikan, merencanakan, mengembangkan, mengatur kembali, merekonstruksi, menguatkan kembali, mengorganisasikan kembali, merevisi , menstrukturkan, mensubstitusikan , memvalidasi
6	Evaluasi (Evaluation)	Kemampuan mempertimangkan dan menilai informasi yang didasarkan pada opini seseorang, menghasilkan sesuatu pada akhirnya, dengan ajuan yang diberikan, tanpa jawaban salah dan benar.	menilai , membandingkan, menyimpulkan , mengkritisi , memutuskan, mempertahankan, menginterpretasikan, menjastifikasi, mengacu kembali, mendukung.

DOMAIN AFEKTIF

(Modification based on works of Kibler, et al., and Gronlund)

No	Aspek/Kategori	Deskripsi	Contoh kata Kerja
1	**Menerima (Receiving)**	Keinginan untuk menerima atau mengikuti (kegiatan kelas, buku teks, tugas-tugas, dsb). Aspek Penerimaan dibagi menjadi 3 sub kategori: a. Kesadaran b. Keinginan untuk menerima. c. Mengontrol atau memberi perhatian yang selektif. Dari sisi guru, aspek penerimaan berkaitan dengan mendapatkan (getting), memegang (holding), dan mengarahkan perhatian siswa.	acknowledge, ask, attend, be aware, choose, describe, follow, give, hold, identify, listen, locate, name, receive, reply, select, show alertness, tolerate, use, view, watch
2	**Menanggapi (Responding)**	Berkaitan dengan partisipasi aktif siswa dalam pembelajaran. Siswa termotivasi untuk mengikuti pembelajaran. Aspek ”Menanggapi” mengindikasikan keinginan siswa untuk terlibat dalam pembelajaran dan kegiatan yang berkaitan dengan pembelajaran. Sehingga siswa merasakan adanya kepuasan dalam belajar.	agree (to), answer, ask, assist, communicate, comply, consent, conform, contribute, cooperate, discuss, follow-up, greet, help, indicate, inquire, label, obey, participate, pursue, question, react, read, reply, report, request, respond, seek, select, visit, volunteer, write
3	**Menilai Valuing**	Siswa merasakan manfaat dan nilai dalam mengikuti pembelajaran (dari sisi materi ajar, tugas-tugas, kegiatan, dsb). Perilaku siswa menggambarkan komitmennya dalam mengikuti pembelajaran. Hasil belajar dalam area ini berkaitan dengan kekonsistenan dan kestabilan perilaku dalam mengikuti pembelajaran.	accept, adopt, approve, complete, choose, commit, describe, desire, differentiate, display, endorse, exhibit, explain, express, form, initiate, invite, join, justify, prefer, propose, read, report, sanction, select, share, study, work

4	**Organization**	Konflik terhadap kompleksitas nilai (value) dalam diri siswa diselesaikan oleh siswa sendiri hingga terjadi keseimbangan dalam membangun kekonsistenan sistem nilai internal pada diri siswa. Siswa mengintegrasikan nilai-nilai yang kompleks menjadi suatu nilai yang menjadi pegangannya dalam mengikuti pembelajaran.	adapt, adhere, alter, arrange, categorize, classify, combine, compare, complete, defend, explain, establish, formulate, generalize, group, identify, integrate, modify, order, organize, prepare, rank, rate, relate, synthesize, systemize
5	**Characterization by a Value or Value Complex**	Internalisasi nilai telah mendapatkan tempat pada diri siswa untuk mengontrol perilaku dalam peride yang relative lama yang pada gilirannya membangun karakter gaya hidupnya, Perilaku ini dapat menjadi konsisten dan dapat diprediksi.	act, advocate, behave, characterize, conform, continue, defend, devote, disclose, discriminate, display, encourage, endure, exemplify, function, incorporate, influence, justify, listen, maintain, modify, pattern, practice, preserve, perform, question, revise, retain, support, uphold, use

DOMAIN PSIKOMOTOR

No	Aspek/Kategori	Deskripsi	Contoh
1	**Mengamati (Observing)**	Aktivitas mental yang melibatkan fisik.	The learner observes a more experienced person in his/her performance of the skill. Asked to observe sequences and relationships and to pay particular attention to the finished product. Direct observation may be supplemented by reading or watching a video. Thus, the learner may read about the topic and then watch a performance.
2	**Menirukan (Imitating)**	Menirukan perilaku fisik.	The learner begins to acquire the rudiments of the skill. The learner follows directions and sequences under close supervision. The total act is not important, nor is timing or coordination emphasized. The learner is conscious of deliberate effort to imitate the model.
3	**Mempraktekan (Practicing)**	Mencobakan aktivitas fisik khusus berulabg-ulang (berlatih)	The entire sequence is performed repeatedly. All aspects of the act are performed in sequence. Conscious effort fades as the performance becomes more or less habitual. Timing and coordination are emphasized. Here, the person has acquired the skill but is not an expert.
4	**Mengadaptasi (Adapting)**	Menyelaraskan dan mengatur aktivitas fisik agar lebih sempurna. .	Perfection of the skill. Minor adjustments are made that influence the total performance. Coaching often very valuable here. This is how a good player becomes a better player.
Contoh Kata Kerja perilaku dalam Domain Psikomotor: Bend, grasp, handle, operate, reach relax, shorten, stretch, write, differentiate (by touch), perform (skillfully)			

TAMBAHAN BAHAN EVALUASI

Asesmen tidak terpisahkan dari pembelajaran. Asesmen dapat mempelajari pengalaman dalam diri siswa. STRATEGI Asesmen AKTIF memperkaya pemahaman siswa terhadap materi pelajaran dan dapat meningkatkan keterampilan yang bermanfaat bagi kehidupan siswa. Kemampuan melihat gambaran besar (Big Picture), Mengembangkan keefektifan mengucapkan dan menulis laporan dan kemampuan bekerja kooperatif dengan teman sejawat merupakan keterampilan yang dapat ditingkatkan melalui Aesesmen AKTIF.

Beberapa Strategi dalam ASESMEN

1) **Scoring Rubrics help students focus on content and Instructional Rubrics to guide them in developing presentations, written and oral reports.**
2) **Concept Maps assist students in "seeing the big picture".**
3) **Portfolios document student learning and improve student metacognition.**
4) **Rebecca Teed's Starting Point module Co-operative Learning: Assessment contains strategies that encourage peer-to-peer learning, individual and group grading. The SERC Cutting Edge Assessment site also includes information on the following assessment strategies:**
5) **ConcepTests - Conceptual multiple-choice questions useful in large classes.**
6) **Knowledge Survey - Students answer whether they could answer a survey of course content questions.**
7) **Exams - Find tips on how to make exams better assessment instruments.**
8) **Oral Presentations - Tips for evaluating student presentations.**
9) **Peer Review - Having student assess themselves and each other.**
10) **Written Reports - Tips for assessing written reports.**
11) **Other Assessment Types including concept sketches, case studies, seminar-style courses, mathmatical thinking and performance assessments.**
12) **Click on the link to see a short glossary of assessment terms.**

****

1).Scoring Rubrics help students focus on content and Instructional Rubrics to guide them in developing presentations, written and oral reports.

➢ Developing Scoring Rubrics

"Learning increases when learners have a sense of what they are setting out to learn, a statement of explicit standards they must meet and a way of seeing what they have learned." Loaker, Cromwell and O'Brien (1986) pg.47

One of the timeless verities of student psychology is that students will focus on learning material that will impact their grade. Rubrics are a way to make explicit our expectations of what students will need to know and be able to do in order to receive a given grade. Rubrics help instructors to develop clear and attainable learning objectives for their students and if provided to students prior to the activity, serve to guide their efforts.

Scoring Rubrics Focus and Promote Learning

Assessment sometimes carries a sense of the mysterious for students. They may be told to take notes in class, read the chapter and answer the questions at the end, but they may get few specifics regarding what material will be assessed, and at what depth. In contrast, rubrics given to students **before** the learning activity starts helps them get a clear sense of what knowledge and skills they need in order to achieve a given grade. In their book Learner-Centered Assessment on College Campuses, Hubba and Freed (2000) point out that Scoring rubrics usually contain the following elements:

- Clear statements of the level of knowledge you expect the student to achieve for them to receive a given grade.
- The dimensions of the quality of work you expect the student to achieve.
- Commentaries describing your expectations of knowledge and quality that distinguishes each grade band (e.g. ABCDF).

Keep a few questions in mind while developing an instructional rubric.

- What are the essential elements of high quality work?
- How many levels of achievement are to be described?
- Are the criteria for each level clearly described?

Diane Ebert-May's website titled Classroom Assessment Techniques-Scoring Rubrics contains detailed information regarding the development of these

valuable tools. Click on the following link to see an example of using Scoring Rubrics for assessment of field-based activities in the geosciences and the resources below for other assessment ideas.

Resources

- Browse Information about Rubrics.
- Browse Rubric Examples

Classroom Assessment Techniques Scoring Rubrics

Diane Ebert-May
Department of Plant Biology
Michigan State University

"...[First] when I began teaching a large introductory biology course (600 students) I knew that my multiple choice tests were not providing me the kinds of data I wanted about my students' thinking... Second, I believed that my students needed to learn how to write and speak to explain themselves in the sciences as well as every other facet of their education, and it was my responsibility to assist all of them in this process. On the other hand, I needed a reality check. How would I find time to evaluate 600 writing samples, especially if I asked students to practice writing/speaking more than once throughout the semester? So I stumbled upon the term "rubric"..."

WHY USE THE RUBRICS?
Has a student ever said to you regarding an assignment, "But, I didn't know what you wanted!" or "Why did her paper get an 'A' and mine a 'C?'" Students must understand the goals we expect them to achieve in course assignments, and importantly, the criteria we use to determine how well they have achieved those goals. Rubrics provide a readily accessible way of communicating and developing our goals with students and the criteria we use to discern how well students have reached them.

WHAT IS A RUBRIC?
Rubrics (or "*scoring tools*") are a way of describing evaluation criteria (or "*grading standards*") based on the expected outcomes and performances of students. Typically,

rubrics are used in scoring or grading written assignments or oral presentations; however, they may be used to score any form of student performance. Each rubric consists of a set of scoring criteria and point values associated with these criteria. In most rubrics the criteria are grouped into categories so the instructor and the student can discriminate among the categories by level of performance. In classroom use, the rubric provides an "objective" *external standard* against which student performance may be compared

WHAT IS INVOLVED?

Instructor Preparation Time:	Medium to High.
Preparing Your Students:	Continuous; but students catch on fairly quickly.
Class Time:	Variable. As students use rubrics, they become better writers and oral presenters; hence the time instructors spend evaluating students' work is reduced.
Disciplines:	All.
Class Size:	All. Rubrics are easy to use in small classes, and are particularly useful in large classes to facilitate scoring large numbers of written or oral assignments
Special Classroom/Technical Requirements:	None.
Individual or Group Involvement:	Both.
Analyzing Results:	The level of analysis depends on the instructor's intended goal of the assessment task and the type of data desired about students' performance. For detailed analysis of students' responses, each section of the rubric can be scored independently then totaled. For a holistic analysis of students' responses, all sections of the rubric can be blended and an overall score assigned.
Other Things to Consider:	Rubrics must be readily available to students before they begin an assignment or written test. Posting rubrics on the web and including them in the course pack for in-class writing promotes their usefulness.

Next Page

Tell me more about this technique:

Introduction
Description, Purpose, and Limits
Goals, Use, and Instructions
Variations, Analysis, and Pro/Challenges
Theory, Links, and Sources

Diane Ebert-May
View Entire Technique
Download Technique
Tools

Assessing Field-based Activities

Field-based activities are rich venues for building student's conceptual knowledge and learning the skills that geoscientists use in gathering ground-truth data. Real world experiences in the field show students that outcrops are much more complex than figures in a textbook. As such they provide the opportunity for faculty and graduate teaching assistants to engage students in the process of developing geological interpretations from a given set of data. In the activity Geologic Mapping I the faculty has identified three learning objectives. These are:

- Combine field observations of location and lithology to make a geologic map.
- Understand the continuity of rock units under the topography between outcrops and at depth.
- Understand the interpretive quality of geologic maps and cross sections.

Developing Rubrics for Field-based Activities

Field-based activities require students to perform complex tasks that include collecting and interpreting data. Assessing a student's performance is also a complex task for the faculty charged with fairly assessing a student's achievement of the activity's learning objectives. Rubrics are a tool to make the task easier and fairer for both the student and faculty because they can measure such complex tasks as writing and the interpretation of data directly. Handed out prior to the activity, rubrics will focus what is important for students to do and produce. Start by asking yourself, "what would constitute an A grade in each of my learning objectives. Then how a B, C, D would differ from the ideal A performance. Here is an example developed for students working to develop a geologic map and cross-section of folded and faulted sedimentary rock units. As you can see in the example, each of the learning.

objectives of the activity has a corresponding set of grading criteria ranging from a high of 4 to a low of 1. The scores for each learning objective may be summed and divided by the number of learning objectives (in this case 3) to obtain a final grade for the activity. Click on the following hotlink to download the rubric, or see the resources below for other assessment ideas.

Geologic Mapping I Activity Scoring Rubric

Learning Objective	4	3	2	1
Combine field observations of location and lithology to make a geologic map.	The map contains at least four different strikes and dips measured at the locations noted along section A-A' perpendicular to regional strike. All strikes and dips are accurate to within 5%	The map contains at least four different strikes and dips measured at the locations noted along section A-A' perpendicular to regional strike. All strikes and dips are accurate to within 10%	The map contains at least four different strikes and dips measured at the locations noted along section A-A' perpendicular to regional strike. Some strikes and dips are not accurate to within 10%	The map contains less than four different strikes and dips measured at the locations noted along section A-A' perpendicular to regional strike. None of the strikes and dips are accurate to within 10%
Understand the continuity of rock units under the topography between outcrops and at depth.	The cross section developed is consistent with all major structural features present and reflects the actual order of all stratigraphic units present	The cross section developed is consistent with most major structural features present and reflects the actual order of all stratigraphic units present	The cross section developed is consistent with most major structural features present and reflects the actual order of most stratigraphic units present	The cross section developed is consistent with some major structural features present and reflects the actual order of some of the stratigraphic units present
Understand the interpretive quality of geologic maps and cross sections.	The final report provides an internally consistent interpretation linking all structural and stratigraphic elements into the regional expression of the tectonic event.	The final report provides an internally consistent interpretation linking most structural and all stratigraphic elements into the regional expression of the tectonic event.	The final report provides an somewhat internally consistent interpretation linking most structural and most stratigraphic elements into the regional expression of the tectonic event.	The final report does not provide an internally consistent interpretation linking structural and stratigraphic elements into the regional expression of the tectonic event.

Resources

- **Using Campus Walks in Introductory Earth Science Classes.** [Francek, 1996] This article in the Journal of College Science Teaching presents ideas for brief trips that can be organized on any campus to view lithologic, geomorphic, meteorologic, and biotic phenomena. The study aims to help enable students to cultivate observation and inquiry skills. Topics discussed

during these mini-fieldtrips include rocks and minerals, weathering, microlandforms, weather, daytime astronomy, biogeography and soils. The article also provides tips for organizing trips. (citation and description)

- **The Transported Fossil Bed: Bringing Field Studies in Ancient Life to Any Campus.** [Hartman and Dubowsky, 1989] This article in American Biology Teacher describes a project designed to transport a rich fossil-bearing bed of rock to the campus of a community college for analysis by undergraduate students. All the arrangements, including acquisition of the rock, transportation, and project costs are discussed. (citation and description)
- **Groundwater Field Station for Geoscience Students.** [Hudak, 1999] This article from the Journal of Geography describes how to create a low-cost groundwater field station for a college hydrogeology course. The article discusses how students use the station to collect and interpret data from wells, and to study spatial hydraulic-head measurements to learn about groundwater flow. The article also discusses why hands-on activities are a valuable addition to a hydrogeology course. (citation and description)
- **Effect of Field Activities on Student Learning.** [Kern and Carpenter, 1986] This article from the Journal of Geological Education presents a study that assessed the influence of field activities versus classroom-contained activities upon students in an earth science laboratory course. Test results indicated that both groups had identical levels of lower-order learning but the field-oriented group demonstrated higher levels of understanding and application. (citation and description)
- **Active Learning in Secondary and College Science Classrooms: A Working Model for Helping the Learner to Learn.** [Michael and Modell, 2003] This book by Joel Michael and Harold Modell is designed for professionals interested an active learning approach to teaching students. The main topics covered in this book are how to build the foundation for active learning, roles for the teacher in creating an active learning environment and creating active learning environments. (citation and description)
- **Assessment Essentials: Planning, Implementing, and Improving Assessment in Higher Education.** [Palomba and Banta, 1999] This book by Catherine Palomba and Trudy Banta is a step-by-step guide that provides the most current practices for developing assessment programs on college and university campuses. Each chapter of the book addresses a specific aspect of assessment and is designed to walk users through various

steps of the assessment process. The authors describe effective assessment programs and offer a thorough review of the most up-to-date practices in the field. (citation and description)

- **Learning Geologic Time in the Field.** [Thomas, 2001] This article in the Journal of Geoscience Education describes a method used to teach the concept of geologic time to introductory geology students using an inquiry-based approach. Students work in teams to obtain rock samples that are used to interpret the geologic history of a region. (citation and description)

➢ Developing Instructional Rubrics

Instructional Rubrics That Address Presentations/Reports

Assessing student work by means of oral and written reports are golden opportunities to teach students skills that they will use throughout their working lives. Both oral and written reports share common themes and therefore can be addressed together. Introductory thesis paragraphs, a body of evidence with support for assertions and summaries of findings are common elements in both oral and written reports. In beginning to develop a rubric for written reports or oral presentations ask yourself these questions:

- What prior experience do my students have in preparing oral/written reports?
- What do I feel are the essential elements I will expect them to include (e.g. citations, supporting evidence)?

  Considering the experience of students in guiding their work will determine how much support they will need to be able to achieve your expectations. Providing samples/models of what you consider excellent work will provide them with a mental framework to build their own reports. Elements of the framework include:
- What are the essential elements of a high quality report?
- How many levels of achievement are to be described?
- Are the criteria for each level clearly described?

The following hotlinks will bring you to specific examples of using an instructional rubric to assess a geoscience project-based learning activity and a Laboratory activity See the resources below for other assessment tools.

Resources

- **Classroom Assessment Techniques: Attitude Surveys.** This page describes attitude surveys, one of a series of Classroom Assessment Techniques (CATs) provided by the Field-tested Learning Assessment Guide (FLAG) website. The CATs of FLAG were constructed as a resource for science, technology, engineering and mathematics instructors to emphasize deeper levels of learning and to give instructors valuable feedback during a course. The attitude surveys consist of a series of statements in which students are asked to express their agreement or disagreement using a scale, thus providing information on the students' perceptions of their classroom experience. The site provides an overview of this assessment instrument, including information about how to use an attitude survey. This site is also linked to a set of discipline-specific "tools" that can be downloaded for immediate use, as well as supplementary links and sources are included to further explore this assessment technique. (more info)
- **Classroom Assessment Techniques: Conceptual Diagnostic Tests.** This page describes conceptual diagnostic tests, one of a series of Classroom Assessment Techniques (CATs) provided by the Field-tested Learning Assessment Guide (FLAG) website. The CATs of FLAG were constructed as a resource for science, technology, engineering and mathematics (STEM) instructors to emphasize deeper levels of learning and to give instructors valuable feedback during a course. Conceptual diagnostic tests are used to assess how well students understand key concepts in a STEM field prior to, during, and after instruction. They assess student understanding using a multiple-choice or short-answer format that has been designed to address misconceptions. This site provides an overview of this assessment instrument including information about why conceptual diagnostic tests are beneficial to use and how to use them. The site is also linked to a set of discipline-specific "tools" that can be downloaded for immediate use, as well as supplementary links and sources to further explore this assessment tool. (more info)
- **Classroom Assessment Techniques: Interviews.** This page describes the technique of using interviews to assess student understanding. The assessment tool is one of a series of Classroom Assessment Techniques (CATs) provided by the Field-tested Learning Assessment Guide (FLAG) website. The CATs of FLAG were constructed as a resource for science, technology, engineering and mathematics

(STEM) instructors to emphasize deeper levels of learning and to give instructors valuable feedback during a course. Interviews enable instructors to judge the extent of understanding students have developed with respect to a series of well-focused, conceptually-related scientific ideas. This site provides an overview of this assessment instrument including information about how to use classroom interviews to their maximum benefit. The site is also linked to a set of discipline-specific "tools" that can be downloaded for immediate use, as well as supplementary links and sources to further explore this assessment tool. (more info)

- **Classroom Assessment Techniques: A Handbook for College Teachers (Second Edition).** [Angelo and Cross, 1993] This book by Thomas Angelo and K. Patricia Cross provides a practical guide to help faculty develop a better understanding of the learning process in their own classrooms and assess the impact of their teaching upon it. The authors offer detailed how-to advice on classroom assessment - from what it is and how it works to how to plan, implement, and analyze assessment projects. Their approach is illustrated through numerous case studies. The book features fifty Classroom Assessment Techniques, each presented in a format that provides an estimate of the ease of use, a concise description, step-by-step procedures for adapting and administering the technique, practical advice on how to analyze the data and other useful information. (citation and description)
- **A Data Rich Exercise for Discovering Plate Boundary Processes.** [Sawyer et al., 2005] This article in the Journal of Geoscience Education describes a classroom exercise based on four world maps containing earthquake, volcano, topographical and seafloor age data. Students participate in this exercise by using a "jigsaw" approach, in which they break into four groups and become specialists on one of the map types. After being organized into new groups with one specialist from each map represented, the groups present their data from the class. This exercise (assessment tool) has shown that students come away with knowledge of the key features of each type of plate boundary and a sense of why it looks the way it does. (Full Text Online)
- **An Investigation of Student Engagement in a Global Warming Debate.** [Schweizer and Kelly, 2005] This article in the Journal of Geoscience Education investigates how using debate as a pedagogical tool for assessing earth system science concepts can promote active student learning, present a realistic and dynamic view of science, and provide a mechanism for integrating the scientific, political and social dimensions of global environmental change. This is achieved by

using the causes of global warming as an example of earth system science for the debate. (Full Text Online)

- **Classroom Assessment Techniques: Minute Paper.** This page describes the minute paper, one of a series of Classroom Assessment Techniques (CATs) provided by the Field-tested Learning Assessment Guide (FLAG) website. The CATs of FLAG were constructed as a resource for science, technology, engineering and mathematics (STEM) instructors to emphasize deeper levels of learning and to give instructors valuable feedback during a course. The minute paper is a concise note, taking one minute and written by students, that focuses on a short question presented by the instructor to the class. It provides real-time feedback from a class to find out if students recognized the main points of a class session and also helps the instructor make changes for the next class. This site provides an overview of this assessment instrument including information about how to use minute papers in the classroom. The site is also linked to a set of discipline-specific "tools" that can be downloaded for immediate use, as well as supplementary links and sources to further explore this assessment tool. (more info)
- **Classroom Assessment Techniques: Weekly Reports.** This site describes the use of weekly reports as an assessment tool for student learning. It is one of a series of Classroom Assessment Techniques (CATs) provided by the Field-tested Learning Assessment Guide (FLAG) website. The CATs of FLAG were constructed as a resource for science, technology, engineering and mathematics instructors to emphasize deeper levels of learning and to give instructors valuable feedback during a course. Weekly reports provide rapid feedback about what students think they are learning and what conceptual difficulties they are experiencing. This site provides an overview of this assessment technique including information about how to use it. The site is also linked to a set of discipline-specific "tools" that can be downloaded for immediate use, as well as supplementary links and sources to further explore this assessment tool. (more info)
- **Classroom Assessment Techniques: A Handbook for College Teachers (Second Edition).** [Angelo and Cross, 1993] This book by Thomas Angelo and K. Patricia Cross provides a practical guide to help faculty develop a better understanding of the learning process in their own classrooms and assess the impact of their teaching upon it. The authors offer detailed how-to advice on classroom assessment - from what it is and how it works to how to plan, implement, and analyze assessment projects. Their approach is illustrated through numerous case studies. The book features fifty Classroom Assessment Techniques, each presented in a format that provides an estimate of the ease of use, a concise description, step-by-step procedures for adapting and administering the technique,

practical advice on how to analyze the data and other useful information. (citation and description)

- **A Cohort-Driven Assessment Task for Scientific Report Writing.** [Chuck and Young, 2004] This article from the Journal of Science Education and Technology describes a formative assessment task that was developed to improve the scientific report writing skills of university students. The assessment task involved feedback from instructor to students before final submission of their reports, as well as the instructor's use of a cohort-specific marking scheme based on the deficiencies that were evident within the class group. Using a mixture of peer and self-review against specific criteria, the students were required to resubmit an amended report. This technique proved to be efficient for both parties and also resulted in improvement of skills of the entire student population. (citation and description)
- **Weekly Reports: Student Reflections on Learning. An Assessment Tool Based on Student and Teacher Feedback.** [Etkina and Harper, 2002] This article from the Journal of College Science Teaching details the use of weekly reports; a structured journal form of formative assessment that allows instructors to receive information from students and alter their instruction based on student needs. (citation and description)
- **Weekly Reports: A Two-Way Feedback Tool.** [Etkina, 2000] This article from Science Education describes how to use weekly reports written by students as a two-way feedback tool in teaching science. The weekly reports help students to reflect on their knowledge, learn how to ask questions, and predict what questions their teacher is likely to ask. The reports help teachers to identify the difficulties their students experience while learning new material, to adjust their teaching to the students' needs, and to match the levels of difficulty of learning and testing. The authors of this study conclude that there is a common mismatch between learning and assessment and offers a solution through weekly journals. (citation and description)
- **Assessing Science Understanding: A Human Constructivist View.** [Novak, Mintzes and Wandersee, 2000] This book by Joel J. Novak, James H. Mintzes, and Joseph D. Wandersee describes different kinds of assessments for measuring student understanding of science concepts. The book explores many assessment types and how they can be used in the classroom to improve instruction and learning. Topics include assessment concept maps, structured interviews, observations, portfolios and written products. The book also provides useful examples, data, and extensive references to the literature. (citation and description)
- **Applying Argumentation Analysis to Assess the Quality of University Oceanography Students' Scientific Writing.** [Takao, Prothero and Kelly, 2002]

This article from the Journal of Geoscience Education describes a study which examined 24 student papers from an introductory oceanography class and analyzed the quality of their written arguments. The article discusses ways of using argumentation to help students understand how to tie data to theoretical assertions and to provide ways for students and teachers to assess the uses of evidence in scientific writing. Included is an argumentation analysis model that describes argument structure according to epistemic levels. (Full Text Online)