Searching to Learn

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Introduction

- Students often have trouble selecting meaningful & refined topics for assignments
- Enter **searching to learn** strategy
- Today: hands-on session with a guided practice exercise

Previous slide Maze: http://www.flickr.com/photos/wwworks/2786241330/sizes/z/in/photostream/


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The Problem

- Difficulty selecting meaningful topics
- Low-level questions common
- Lack of background (world) knowledge
- Related struggles with
  - Formulating a search query
  - Determining what information is relevant
- Students need information seeking knowledge **AND** content knowledge

Searching to Learn

- Strategy to actively construct background knowledge
- Combining prior knowledge and the information found in the search results lists
- Begin with a general or broad topic
- Carry out searches – multiple resources
- Discover important concepts or aspects from the search results
- Expand basic understanding
- Observe specialized terminology in the topic area

Background

- Pre-search and discovery process (Fontichiaro, 2013)
  - Give students time to discover before settling down on a refined topic
  - Common strategies
    - Wikipedia, encyclopedia
    - Provide short introductory text
- Additional strategy: exploratory searching
    - Use ***searching to learn*** as a major part of the discovery process

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Exploratory Phase Doesn't Come Naturally

- Kuhlthau (1994) research: Information Search Process
- Students did not consider the exploratory stages "a legitimate part of the search process"
- "…lack of tolerance for the early exploratory stages…"
- "Rarely did students acknowledge the need for time to read and reflect in order to formulate a focus to move the search ahead."
- **Apparently school librarians need to teach this**

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Searching as a Learning Process

- Jansen, Booth, & Smith (2009) information searching can be considered a learning process
- Use searching not for decision making or problem solving but for learning
- Use learning theory to understand information searching

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Learning Happens **While** Searching!

- Saito et al. (2011, 2012) investigated "the changes in users' mental representations of a topic during their exploratory search..."
- Used concept maps to "compare the users' knowledge before and after a search."
- Analysis of the concept maps showed participants changed their knowledge structure based on what they learned during their search

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Concept mapping

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Concept Mapping

- Technique for representing knowledge in maps
- Concept maps are networks of concepts
- Networks consist of nodes and links
- Nodes represent concepts and links represent the relations between concepts
- Links might be labeled to describe relationship
- Hierarchical links (from general to specific)
- Cross-links (between domains, across hierarchy)

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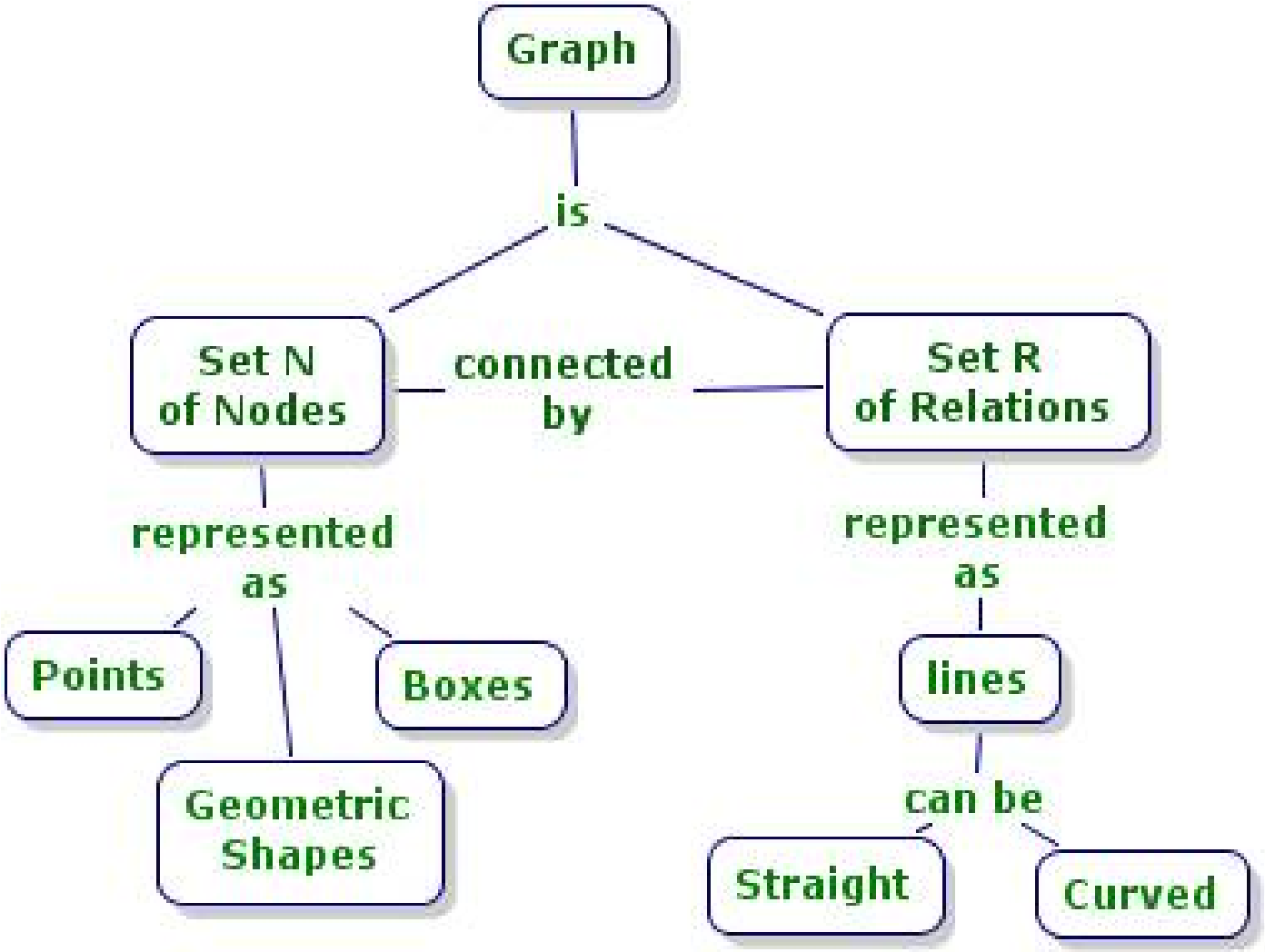
Concept Map



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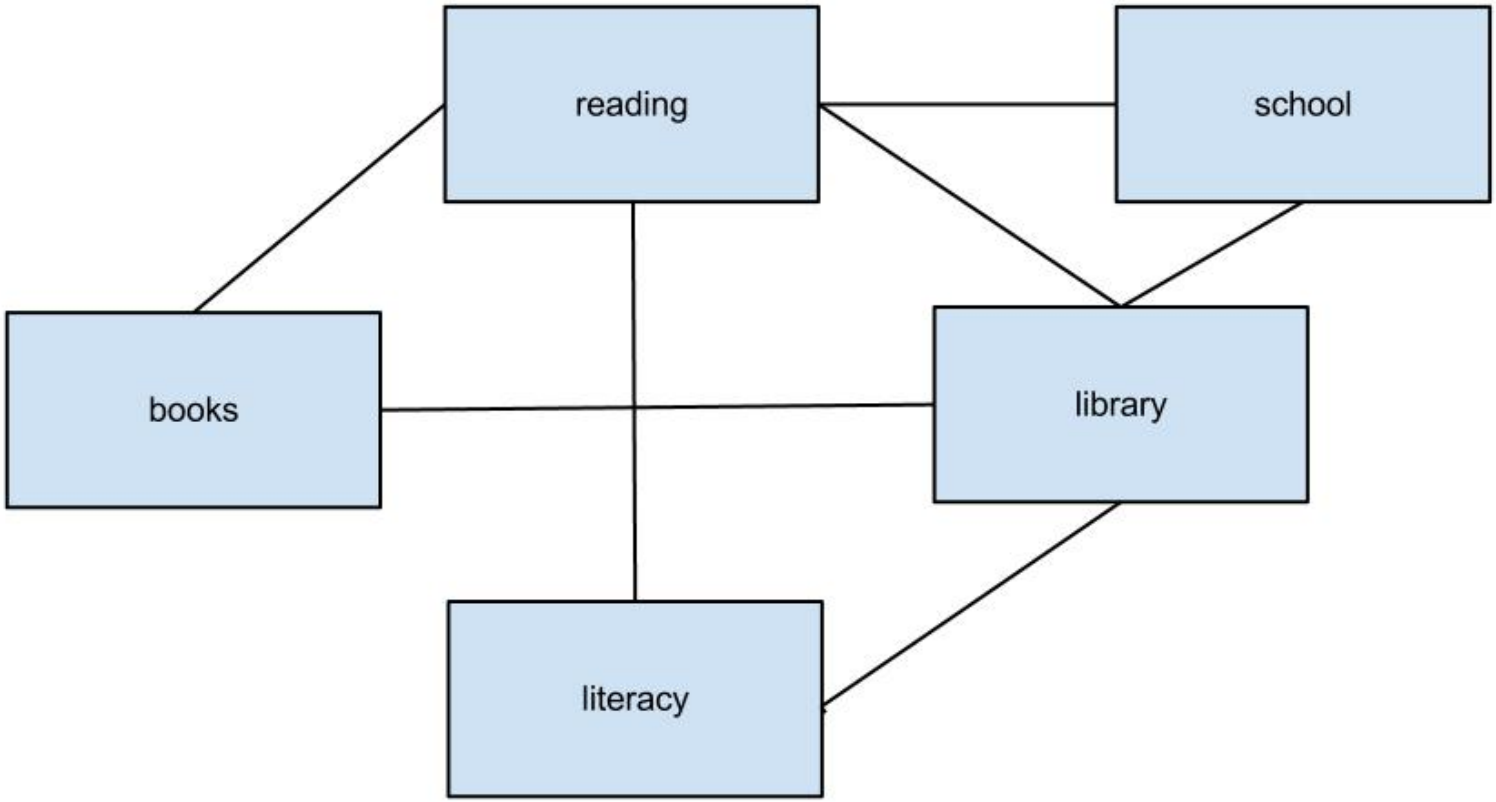
http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/2f/7c/9c.pdf

Guided Exercise

Example – “reading”

Initial concept map – “reading”



Search Results - 1

1. Dimensions of Reading Motivation and Their Relation to Reading Behavior and Competence.

Subjects: READING motivation; READING -- Research; CURIOSITY; READING comprehension; CHOICE (Psychology); MOTIVATION (Psychology)

2. Associations Between Reading Achievement and Independent Reading in Early Elementary School: A Genetically Informative Cross-Lagged Study.

Subjects: EDUCATIONAL psychology -- Research; EXPERIMENTAL design; LONGITUDINAL method; READING achievement; INDEPENDENT reading; ELEMENTARY education

3. The Relation Between Elementary Students' Recreational and Academic Reading Motivation, Reading Frequency, Engagement, and Comprehension: A Self-Determination Theory Perspective.

Subjects: READING comprehension; READING; MOTIVATION (Psychology); GRADING & marking (Students); LEISURE; QUESTIONNAIRES

Search Results - 2

4. Exploring intrinsic and extrinsic reading motivation among very good and very poor readers.

Subjects: READING motivation; MOTIVATION in education; READERS -- Evaluation; CHILDREN -- Books & reading; RESEARCH; READING -- Ability testing; CASE studies; ENGLAND

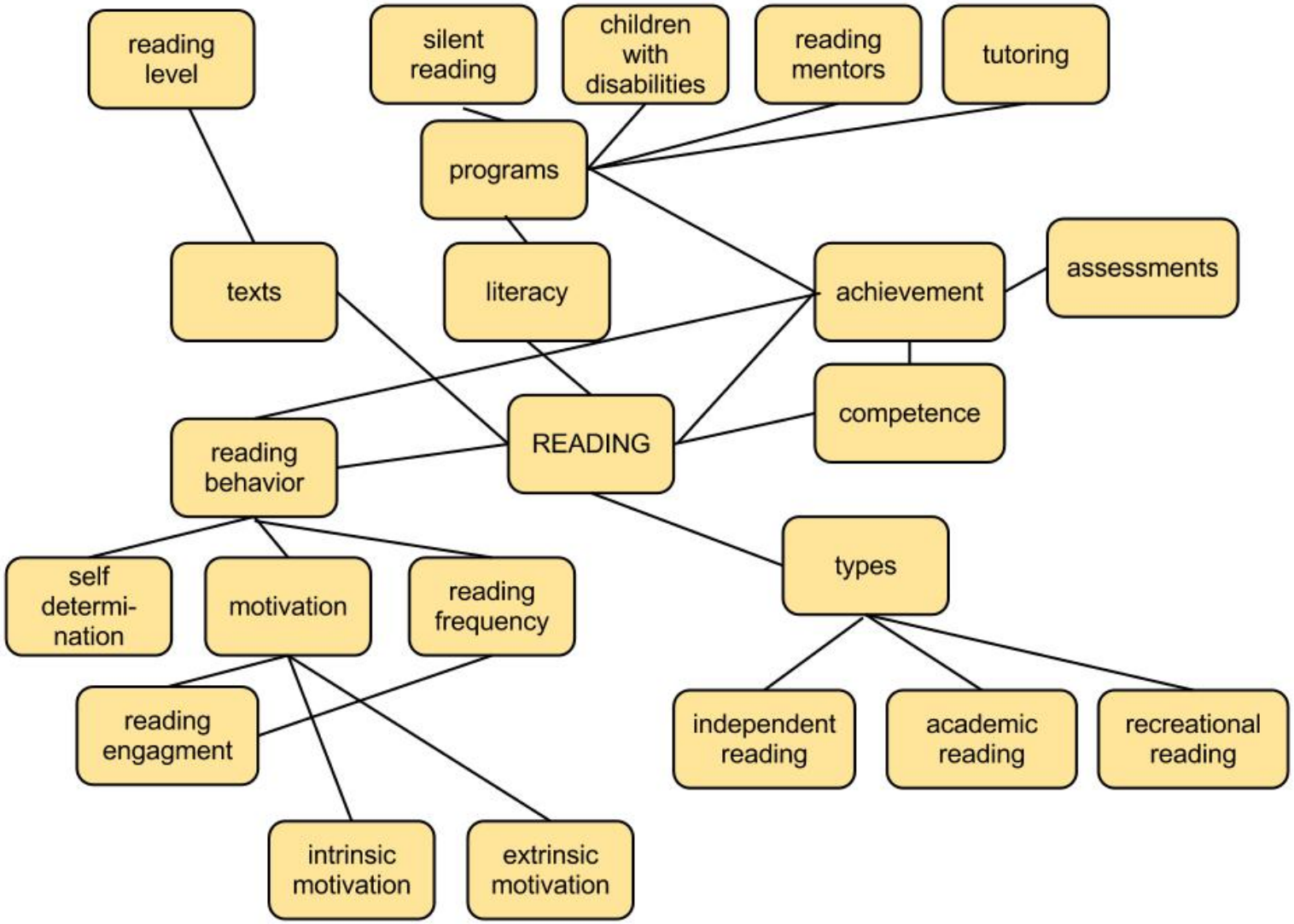
5. Helping Students With Moderate and Severe Intellectual Disability Access Grade-Level Text.

Subjects: CHILDREN with mental disabilities -- Education (Elementary); READING strategies; READING comprehension; READING comprehension -- Study & teaching; LITERACY; READING exercises; CHILDREN with mental disabilities –

6. Becoming the Reading Mentors Our Adolescents Deserve: Developing a Successful Sustained SilentReading Program.

Subjects: CASE studies; SILENT reading; TEENAGERS -- Books & reading; LITERACY -- Research; LITERACY programs; READING(Secondary); Exam Preparation and Tutoring

Post-search concept map



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Guided Exercise: Individually

- Create initial concept map on plate tectonics
  - 2 minutes
- Study search results on plate tectonics
  - 6 minutes
- Create new concept map on plate tectonics
  - 4 minutes

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Guided Exercise: Individually

- **Create initial concept map on plate tectonics**
  - 2 minutes
- Study search results on plate tectonics
  - 6 minutes
- Create new concept map on plate tectonics
  - 4 minutes

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Time's Up!

Next Step: study the search results

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Guided Exercise: Individually

- Create initial concept map on plate tectonics
  - 2 minutes
- **Study search results on plate tectonics**
  - 6 minutes
- Create new concept map on plate tectonics
  - 4 minutes

A

Time's Up!

Next Step: create a new concept map

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Guided Exercise: Individually

- Create initial concept map on plate tectonics
  - 2 minutes
- Study search results on plate tectonics
  - 6 minutes
- **Create new concept map on plate tectonics**
  - 4 minutes

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Time's Up!

Next Step: organize into groups of 3

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Guided Exercise: Groups

- Concept map discussion (10 minutes)
  - compare maps
    - discuss individual pre- and post-searching to learn differences
    - discuss between group map differences

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Guided Exercise: Groups

- Concept map discussion (10 minutes)
  - compare maps
    - discuss individual pre- and post-searching to learn differences
    - discuss between group map differences

2 minutes

Time's Up!

Next Step: debrief

Wrap-up

- What did you learn?
- Will you use **searching to learn** strategies?
  - If so, how?

- Presentation materials available:

  http://digitalcommons.usu.edu/itls_facpub/253/

Bibliography

- Maze / photo by Woodleywonderworks http://www.flickr.com/photos/wwworks/2786241330/sizes/z/in/photostream/
- Fontichiaro, K. (2013). Research Strategies Grades 6-8. School Library Monthly, 29(4), 51-53.
- Jansen, B. J., Booth, D., & Smith, B. (2009). Using the taxonomy of cognitive learning to model online searching. Information Processing & Management, 45(6), 643-663.
- Kuhlthau, C. C. (1994) Students and the information search process: zones of intervention for librarians. Advances in librarianship, 18, 57-72.
- Riedling, A. M. (2005). Reference and the School Library: An Overview Reference Skills for the School Library Media Specialist : Tools and Tips. Worthington, Ohio: Linworth Books.
- Saito, H., Egusa, Y., Takaku, M., Miwa, M., & Kando, N. (2012). Using Concept Map to Evaluate Learning by Searching. Paper presented at the 34th Annual Meeting of the Cognitive Science Society, August 2012.
- Saito, H., Nakashima, R., Egusa, Y., Takaku, M., Terai, H., Miwa, M., et al. (2011). Changes in Users' Knowledge Structures Before and After Web Search on a Topic: Analysis Using the Concept Map. Paper presented at the 74th Annual Meeting of the American Society for Information Science and Technology.

1. A heat flow based cooling model for tectonic plates.
Subjects: PLATE tectonics; TERRESTRIAL heat flow; COOLING; HYDROTHERMAL circulation (Oceanography); LITHOSPHERE; OCEANIC crust; EARTH sciences; EARTH; EARTH -- Mantle

2. Active tectonics of plate boundary zones and the continuity of plate boundary deformation from Asia to North America.
Subjects: PLATE tectonics; BOUNDARIES; DEFORMATION of surfaces; HOMOTOPY theory; GEODESY; ASIA; NORTH America

3. An Interdisciplinary Theme: Topographic Maps and Plate Tectonics.
Subjects: TOPOGRAPHIC maps; PLATE tectonics; LANDFORMS; INTERDISCIPLINARY approach in education; MIDDLE school education; STUDENTS; SOCIAL sciences -- Study & teaching

4. Constraints of the topography, gravity and volcanism on Venusian mantle dynamics and generation of plate tectonics.
Subjects: VOLCANISM; PLATE tectonics; CONVECTION (Meteorology); HOT spots (Geology); RAYLEIGH number; NUMERICAL calculations; CATASTROPHES (Geology); VENUS (Planet)

5. Deciphering tectonic phases of the Amundsen Sea Embayment shelf, West Antarctica, from a magnetic anomaly grid.
Subjects: GEOLOGY, Structural; GEOMAGNETISM; ICE streams; PLATE tectonics; AMUNDSEN Sea (Antarctica); EARTH; ANTARCTICA; EARTH -- Crust

6. Depth-dependent viscosity and mantle stress amplification: implications for the role of the asthenosphere in maintaining plate tectonics.
Subjects: PLATE tectonics; VISCOSITY; BOUNDARY layer (Meteorology); LITHOSPHERE; RHEOLOGY; COMPUTER simulation; EARTH; EARTH -- Mantle

7. Dynamic role of tectonic mélange during interseismic process of plate boundary mega earthquakes.
Subjects: PLATE tectonics; MELANGES (Petrology); EARTHQUAKE zones; SUBDUCTION zones; ROCK deformation; SEDIMENTS (Geology); JAPAN

8. Evolution of Macquarie Ridge Complex seamounts: Implications for volcanic and tectonic processes at the Australia–Pacific plate boundary south of New Zealand.
Subjects: SEAMOUNTS; VOLCANISM; GEOMORPHOLOGY; MAGMAS; PLATE tectonics; NEW Zealand

9. Geodetic investigation of plate spreading along a propagating ridge: the Eastern Volcanic Zone, Iceland.
Subjects: GEODETIC satellites; GEODESY; VOLCANOES; PLATE tectonics; LITHOSPHERE; MAGMAS; TRANSIENTS (Dynamics); DEFORMATIONS (Mechanics); INTERFEROMETRY; MID-ocean ridges; ICELAND

10. How plate tectonics is recorded in chalk deposits along the eastern English Channel in Normandy (France) and Sussex (UK).
Subjects: PLATE tectonics; STRAINS & stresses (Mechanics); FRACTURE mechanics; DEFORMATIONS (Mechanics); CENOZOIC Era; ENGLISH Channel; NORMANDY (France); FRANCE; ENGLAND; SUSSEX (England)

11. Geologically current plate motions.
Subjects: PLATE tectonics; OCEAN currents; OCEAN bottom; EARTH; EARTH -- Surface

12. Integrated Analysis on Gravity and Magnetic Fields of the Hailar Basin, NE China: Implications for Basement Structure and Deep Tectonics.
Subjects: GRAVITY; MAGNETIC fields; GEOLOGY, Structural; PLATE tectonics; MANCHURIA (China); CHINA

13. Linking continental drift, plate tectonics and the thermal state of the Earth's mantle.
Subjects: CONTINENTAL drift; PLATE tectonics; QUANTITATIVE research; MAGMATISM; INSULATION (Heat); VOLCANISM; SNOWMELT; EARTH; Roofing, Siding, and Insulation Material Merchant Wholesalers; Drywall and Insulation Contractors; EARTH -- Mantle

14. Mantle constraints on the plate tectonic evolution of the Tonga–Kermadec–Hikurangi subduction zone and the South Fiji Basin region.
Subjects: PLATE tectonics; SUBDUCTION zones; BASINS (Geology); OPHIOLITES; EARTH; FIJI; EARTH -- Mantle

15. Mantle convection models featuring plate tectonic behavior: An overview of methods and progress.
Subjects: PLATE tectonics; CONVECTION (Meteorology); HEAT flux; TEMPERATURE; GEODYNAMICS; FORCE & energy; EARTH; EARTH -- Mantle; EARTH -- Surface

16. New paradigm for the early Earth: did plate tectonics as we know it not operate until the end of the Archean?
Subjects: GEOLOGY, Stratigraphic -- Archaean; MID-ocean ridges; PLATE tectonics; GEODYNAMICS; PLANETS; VENUS (Planet); CRUST

17. Non-random distribution of euler poles: is plate tectonics subject to rotational effects?
Subjects: PLATE tectonics; GEODYNAMICS; ROTATIONAL motion; DISTRIBUTION (Probability theory); INFORMATION theory; PHANEROZOIC Period; LAUSANNE (Switzerland); SWITZERLAND; UNIVERSITY of Lausanne (Lausanne, Switzerland)

18. Plate tectonics and planetary habitability: current status and future challenges.
Subjects: PLATE tectonics; PLANETS; ATMOSPHERE; SOLAR system -- Evolution; SOLAR system; EARTH; EARTH -- Mantle

19. Thrust–wrench interference between major active faults in the Gulf of Cadiz (Africa–Eurasia plate boundary, offshore SW Iberia): Tectonic implications from coupled analog and numerical modeling.
Subjects: THRUST faults (Geology); PLATE tectonics; MATHEMATICAL models; GEOLOGY, Structural; LITHOSPHERE; CADIZ Bay (Spain); SPAIN

20. Trench migration and upper plate strain over a convecting mantle.

Subjects: PLATE tectonics; SUBDUCTION zones; DEFORMATIONS (Mechanics); INTERFACES (Physical sciences); DRAG (Aerodynamics); CONTROL theory (Mathematics); EARTH; EARTH -- Mantle

21. Plate tectonics - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Plate_tectonics
Plate tectonics (from the Late Latin tectonicus, from the Greek: τεκτονικός " pertaining to building") is a scientific theory that describes the large-scale motions of ...
List of tectonic plates - Lithosphere - Convergent boundary - Category: Plate tectonics

22. Plate Tectonics Animation www.ucmp.berkeley.edu/geology/tectonics.html
Interesting animations of plate tectonics movement. Including gif, avi and mov formats.

23. Earth's Continental Plates - ZoomSchool.com
www.enchantedlearning.com/subjects/.../Continents.shtml
All About Plate Tectonics: Earth's Plates and Continental Drift. The Earth's rocky outer crust solidified billions of years ago, soon after the Earth formed. This crust ...

24. This Dynamic Earth--Contents [USGS] pubs.usgs.gov/gip/dynamic/dynamic.html
Jan 10, 2013 – Understanding plate motions · Hotspots thumbnail · Unanswered questions thumbnail · Plate tectonics and people thumbnail · Endnotes ...

25. Plate Tectonics csep10.phys.utk.edu/astr161/lect/earth/tectonics.html
This site provides useful information about tectonics: the origin of plate tectonics, indications of tectonic activity, age of the sea floor.

26. Earth Floor: Plate Tectonics
www.cotf.edu/ete/modules/msese/earthsysflr/plates1.html
Full and clear information about Plate Tectonics: Convergent Boundaries, Divergent Boundaries, Transform Boundaries.

27. Plate Tectonics - National Geographic
science.nationalgeographic.com/.../the.../plate-tectonics-article/ Get information, facts, photos, news, videos, and more about plate tectonics from National Geographic.

28. A Science Odyssey: You Try It: Plate Tectonics
www.pbs.org/wgbh/aso/tryit/tectonics/
A hands-on exercise about plate tectonics and earthquakes from PBS. Requires Shockwave plug-in.

29. A Science Odyssey: You Try It: Plate Tectonics: Intro
www.pbs.org/wgbh/aso/tryit/tectonics/intro.html
Plate tectonics is the theory that Earth's outer layer is made up of plates, which have moved throughout Earth's history. The theory explains the how and why ...

30. Tectonic Plates www.moorlandschool.co.uk/earth/tectonic.htm
Plate tectonics is a relatively new theory and it wasn't until the 1960's that Geologists, with the help of ocean surveys, began to understand what goes on ...

31. BrainPOP | Science | Learn about Plate Tectonics
www.brainpop.com/science/earthsystem/platetectonics/
In this educational animated movie about Science learn about Pangea, tectonics, crusts, mantle, volcanoes, earthquakes, mountains, fault lines, disasters, and ...

32. Plate Tectonics - College of Earth, Ocean, and Environment ...
www.ceoe.udel.edu/deepsea/level-2/geology/plate.html
This map shows the major tectonic plates that make up the Earth's crust and the directions in which they are moving. Map adapted from NOAA. Simply defined ...

33. Interactives . Dynamic Earth . Plate Tectonics
www.learner.org/interactives/dynamicearth/drift.html
Plate Tectonics. Image credits: Adapted from illustrations by Jane Russell from Jacquelyne Kious and Robert Tilling, This Dynamic Earth, USGS, p. 4. About this ...

34. Plate Tectonics - Crust, Lithosphere, Mantle - PhET
phet.colorado.edu/en/simulation/plate-tectonics
Nov 30, 2012 – Explore how plates move on the surface of the earth. Change temperature, composition, and thickness of plates. Discover how to create new ...

35. List of tectonic plates - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/List_of_tectonic_plates
This is a list of tectonic plates on Earth. Tectonic plates are pieces of the Earth's ...

36. Plate Tectonics Map - Plate Boundary Map - GEOLOGY.COM geology.com ›
Satellite Images Plate Tectonics Map and Satellite Views of Plate Boundaries - Geology.com - maps provided by Google.com.

37. PLATE TECTONICS geology.csupomona.edu/drjessey/class/Gsc101/Plate.html
PLATE TECTONICS. Continental Drift. Alfred Wegener first proposes Continental Drift in his book published in 1915. Suggests that 200 million years ago there ...

38. plate tectonics (geology) -- Britannica Online Encyclopedia
www.britannica.com/EBchecked/topic/463912/plate-tectonics
Theory dealing with the dynamics of Earth 's outer shell, the lithosphere, that revolutionized Earth sciences by providing a uniform context for understanding ...

39. Geography4Kids.com: Earth Structure: Plate Tectonics
www.geography4kids.com/files/earth_tectonics.html
There are several major plates floating across the surface of the earth The basic idea behind plate tectonics is that there are eight major plates on the surface of ...