UNIVERSAL DESIGN FOR LEARNING IN ANDRAGOGY: AN OVERLAP WITH PROJECT-BASED, SELF-DIRECTED LEARNING

AS APPLIED IN AN ONLINE PHYSICAL SCIENCE COURSE FOR ADULT LEARNERS

WITH SELECTED HIGHLIGHTS OF AN UPDATED DISSERTATION

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OBJECTIVES

- To show the global characteristics of pedagogy and andragogy as they appear in constructivist learning.
- To prove that principles of universal design of learning, when applied in continuing adult learning, overlap with those of self-directed learning, self-regulated learning and project-based learning .
- To present a model science syllabus which synthesizes the common features of the UDL, SDL, PBL and SRL.

RANI'S RESEARCH ON SELF-DIRECTED LEARNING AND CAST'S WORK ON UNIVERSAL DESIGN FOR LEARNING

Teaching Every Student in the Digital Age: Universal Design for Learning (David Rose and Ann Meyer)

Abstract

Ensuring that all students achieve the same high standard of learning would be much easier if you could quickly and easily customize lesson plans and curriculum materials to each student's needs, interests, and skills level. Here's a book that explains how to make that ideal a reality. Explore the concept of Universal Design for Learning and how it can help you meet standards while you address the unique needs of each student. Drawing from brain research and the power of digital technology, the authors explain how to

- Set appropriate goals for every student.
- Choose the teaching methods and materials that give every student optimum instructional support.
- Ensure the fair and accurate assessment of every student's progress.

Rose, D.H., and Meyer, A. (2002). *Teaching every student in the digital age: Universal Design for Learning*. Alexandria, VA: Association for Supervision and Curriculum Development.

PEDAGOGY VS ANDRAGOGY

- PEDAGOGY: the act of teacher centered learning; teachers are the authority; they provide knowledge and students receive it
- ANDRAGOGY: the act of adult learning; the learner controls the learning process (word coined by Malcolm Knowles)
- Stephen Brookfield notes that adult education is the activity that "assists adults in their quest for a sense of control in their own lives, within their interpersonal relationships. and with regard to the social forms and structures within which they live" (Brookfield, 1985).

CONSTRUCTIVIST THEORY OF LEARNING

- Constructivism is the learning theory based on Jean Piaget's theory of Cognitive development of the learners which involves the accommodation and assimilation of new knowledge to their already existing schemas.
- This means learning is self-directed due to the unique ways neural networks are activated during the learning process.

LEARNING (BEHAVIORAL) THEORY IN PEDAGOGY

- John Watson, Skinner, Ivan Pavlov—familiar names in Education Psychology: they derive the learning theory of "conditioning" learners to a desired goal from John Locke's philosophy that children are blank slates and a teacher or parent can write anything *they* want on the child's blank slate. This is the idea of Pedagogy. Learning is *mostly* imposed, not willingly owned.
- Andragogy based on Constructivist theory, on the other hand, assumes that the learner already has knowledge from his/her experiences of the world and the teacher who takes the role of the "facilitator" helps the learner build on the existing schemas by accommodating and assimilating new experiences to "construct new knowledge". This accommodation and assimilation happens at the learner's choice and pace. Therefore, learner controls and owns his/her learning.

CONSEQUENCE OF CONSTRUCTIVISM IN TEACHING AND LEARNING

- Students learn best when actively involved in the learning process: Jean Piaget
- Learning is a social process, best done in collaboration with a facilitator and/or other learners who would push the learner to his/her zone of proximal development by providing appropriate scaffolding: Lev Vygotsky
- A teacher's role is to facilitate learner's construction of their own knowledge and create the appropriate environment for learning: John Dewey
- Learner owns his/her learning.

SUMMARY OF SLIDES 9-14

- Slide 9: Self-directed Learning Vs Self-directed education
- Slide 10: Terms or coinages used interchangeably with Self-directed learning
- Slide 11: Most relevant in this discussion: Self regulated and problem-based learning
- Slide 12: Self-direction in learning is situational: The Stage self-direction model of Gerard Grow
- Slide 13: Self-directed learning is constructivism in action in Andragogy.

SELF-DIRECTED EDUCATION VS SELF-DIRECTED LEARNING

- Self-directed learning is the basic principle of Andragogy: learner controlling the learning process
- It is the "activity of acquiring skills and knowledge with minimum professional assistance"
- Self-directed education is " the management of the external conditions that bring about self-learning." (Brookfield, 1986). This is the application of Universal Design of Learning.

COINAGES FOR SELF-DIRECTED LEARNING

- *assuming primary responsibility, independent learning, individual responsibility toward learning, intrinsically motivated learning, isolated learning, Learning without a teacher, self-acquired knowledge, self-directed learning pursuits, self-guided learning, self-managed learning,* ***self-regulated learning****, self taught, solitary learning, student generated learning, teacherless individual learners, and unsupervised learning* (Heimstra, 1998).

SELF-DIRECTED LEARNING, SELF-REGULATED LEARNING, PROBLEM/PROJECT-BASED LEARNING (LITERATURE UPDATE)

- Examples of the various facets of self-directed learning, having characteristics of self-directed learning, but not exactly the same.
- Difference depends on the degree of control the learner has over his/her learning (Leong, 2020)
- Learning projects in a high school class, a science project or problem as an assessment in a post-secondary course and a graduate research project have varying degrees of control for the learner and therefore, varying degrees of self-regulation and self-direction.

SITUATIONAL FACETS OF SELF-DIRECTED LEARNING

- *Self-directed learning is situational; multifaceted; various degrees of self-direction*
- *Gerard Grow's model: dependent (teacher is the authority) a traditional student, with varying degrees of learning ability*
- *Involved (teacher is the guide) active learner in any class*
- *Interested (facilitator) adult learner in an online class*
- *self-directed (delegator) a PhD student*

CONSTRUCTIVISM IN ANDRAGOGY

- The coinages of self-directed learning clearly indicate the constructivist nature of self-directed learning.

Its implications in the classroom in face to face or online modality:

- Students have control over their learning pace, environment, modality
- Students are active learners
- They have prior knowledge on many aspects of the discipline because of their life experience
- They "construct" knowledge from new experience with their peers, facilitators and resources other than textbooks. So, learning is a social process.

These are characteristics of self-directed learning, which can happen in isolation or better achieved in the midst of a learning team.

UNIVERSAL DESIGN OF LEARNING

(DAVID, R. H. CENTER FOR APPLIED SPECIAL TECHNOLOGY (CAST), AND HARVARD UNIVERSITY)

- Universal design focuses on eliminating barriers through initial designs that consider the needs of diverse people, rather than overcoming barriers later through individual adaptation.
- Universal design for learning (UDL) is one part of Universal Design, particularly focusing on the art of teaching and learning –Pedagogy or Andragogy.
- UDL emphasizes proactively removing barriers to accessing not only information, but also the teaching, learning, and assessment methods in the learning process for **all levels diverse** learners—in the full spectrum of abilities. (David, R. H., et.al, 2006)

KEY PRINCIPLES OF UDL

- 1. Multiple methods of representation:

Students perceive and comprehend information in different ways.

Eg. Students with physical and learning disabilities, varying levels of intellectual capacities, language and cultural barriers (dependent learners in Grow's model). Therefore,

Use multiple ways to provide the same information.

Curriculum model presented by David H Ross and his mentees from Harvard University:

Highlight key ideas and features; use examples, visuals, in interactive lecture. Lectures, though old method, still relevant; Use voice and body language to accent lecture

Assign teams to take down class notes in their different ways and post them for all classmates to supplement the lecture notes, slides and resources provided by the instructor.

2. MULTIPLE MEANS OF EXPRESSION

- All students do not express the knowledge they constructed in the same way. Therefore,

1. UDL emphasizes providing alternatives for students' means of expression of their knowledge. For example, authentic assessments in lieu of traditional paper and pencil tests.
2. These alternatives must be accessible at the various levels of scaffolds with appropriate levels of support provided. For example, scaffolds in the post secondary levels may include review sessions in class, feedback on the project topic and outlines before the project starts; recommending additional questions on the project for self-directed and intellectually advanced learners

MULTIPLE MEANS OF MOTIVATION

- Mostly external motivators such as grades in traditional pedagogy.
- Intrinsic motivators such as career advancement or pay raise for adult students.
- Other means of motivators include the passion of the instructor for the subject matter; personal stories on the long-term value of the content.
- Individualized, frequent monitoring of student progress, timely feedback given at the various levels of scaffolds.

UDL AT A GLANCE:

A short video clip produced by CAST:

- https://www.youtube.com/watch?v=bDvKnY0g6e4

SDL, SRL, UDL COMPARED

- SDL, SRL and UDL have been derived from the CONSTRUTIVIST theory of learning.
- All three emphasize learner-centered, learner regulated, instructional process, meaning learning is self-regulated.
- Greater the level of self-regulation, that is, student taking control over her learning process and choice of assessment to express her knowledge--greater is her level of self-direction.

SDL, SRL, UDL (CONTINUED)

The three principles of UDL presuppose providing options or the learning environment proactively for learners to take control of his/her learning:

Multiple means of representation of the information and its instructional methods (preferred learning method, modality, team learning or self-learning)

Multiple Means of Expression of new information learned (Assessment). and

Multiple Means of Motivation (personal enrichment, career advancement, higher studies)

Self-directed learning and self-regulated learning presuppose learner taking control of his/her learning and assessment method that best suits his/her learning ability and interest.

Therefore, UDL is the provision and SDL/SRL is the action based on the provision.

DISCUSSION QUESTION:

- Now let's take a couple of minutes for a group discussion and vote:

I argued in my presentation that Universal Design for Learning should be added to the list of coinages in Slide #9 because UDL is a facet of SDL.

How many of you will vote for?

Against?

Abstain?

Those who voted against: Can you tell us why?

SUMMARY OF SLIDES 22-29

- Slides 22-24: Application in SCIENCE and Math: research CONCLUSIONS from my dissertation in 2000
- Slides 25-26: Recommendations Based on Research Conclusions
- Slides 27-29: Applications of recommendations in the last two decades

APPLICATION IN SCIENCE AND MATH: RESEARCH CONCLUSIONS FROM MY DISSERTATION IN 2000

I. The two-year college teachers who participated in the focus groups feel that self directed learning is a viable teaching method in the general/natural sciences and math.

II. Teachers said that self-directed learning could be applied in part or full in the science and math courses in the two-year colleges.

CONCLUSIONS (CONTD)

III. The focus group participants said that teachers should directly teach the fundamental science and math skills to beginning (dependent) students. (pedagogy)

IV. Teachers who identified themselves as self-directed learners as students tend to encourage self-direction in their students.

CONCLUSIONS (CONTD)

V. The participants said that although exceptional teachers encourage inquiry and motivation to learn in the lower classes, those who foster the actual practice of self-directed learning are graduate school teachers.

VI. The focus group participants recognized that the Internet would be a useful tool to foster self-directed learning (application of UDL)

RECOMMENDATIONS BASED ON RESEARCH CONCLUSIONS

1. Contemporary post secondary math and science curriculum should be redesigned to incorporate self-directed learning as an effective option. Administrators should strongly consider revising the mission and restructuring the curricula of two-year colleges to accommodate the educational needs of potential self-directed learners in math and sciences.

2. Schools should allocate instructional, logistical, and financial provisions for self directed learners in order to encourage the use of that teaching/learning option.

RECOMMENDATIONS (CONTD)

4. Teacher education should offer courses in self-directed learning.

5. Self-directed learning should be adopted as a teaching strategy in elementary and high school classes.

APPLICATIONS OF RECOMMENDATIONS IN THE LAST TWO DECADES

1. Adult education and principles of andragogy in community and technical colleges for traditional two-year degrees, professional and career programs and customized training programs.
2. Adult Education programs for non-traditional students becoming a separate division in colleges and universities, using adult education and self-directed learning in part or in full. Example: Judson University's and ICCHE institutions' f2f and online classes)
3. Need-based and customized learning management systems becoming an important learning/teaching accessory; Black-board and E-learn training as part of professional development (Bush Grant at Bethel University for Blackboard training).

APPLICATION …(CONTD)

4. State of the art technology becoming indispensable for teaching, learning and communication in all levels of learning from elementary to graduate.
5. Judson's Associate of Arts Program, both face to face and online using Elearn as the Learning Management System, not only for communication and assessment, but also for providing resources, guidance, facilitation or delegation of learning activities depending on the level of self-direction expected for the course.
6. Physical Science, Life Science and Math for the Associate of Arts program using self-directed learning as the primary instructional strategy is a direct application of my research.

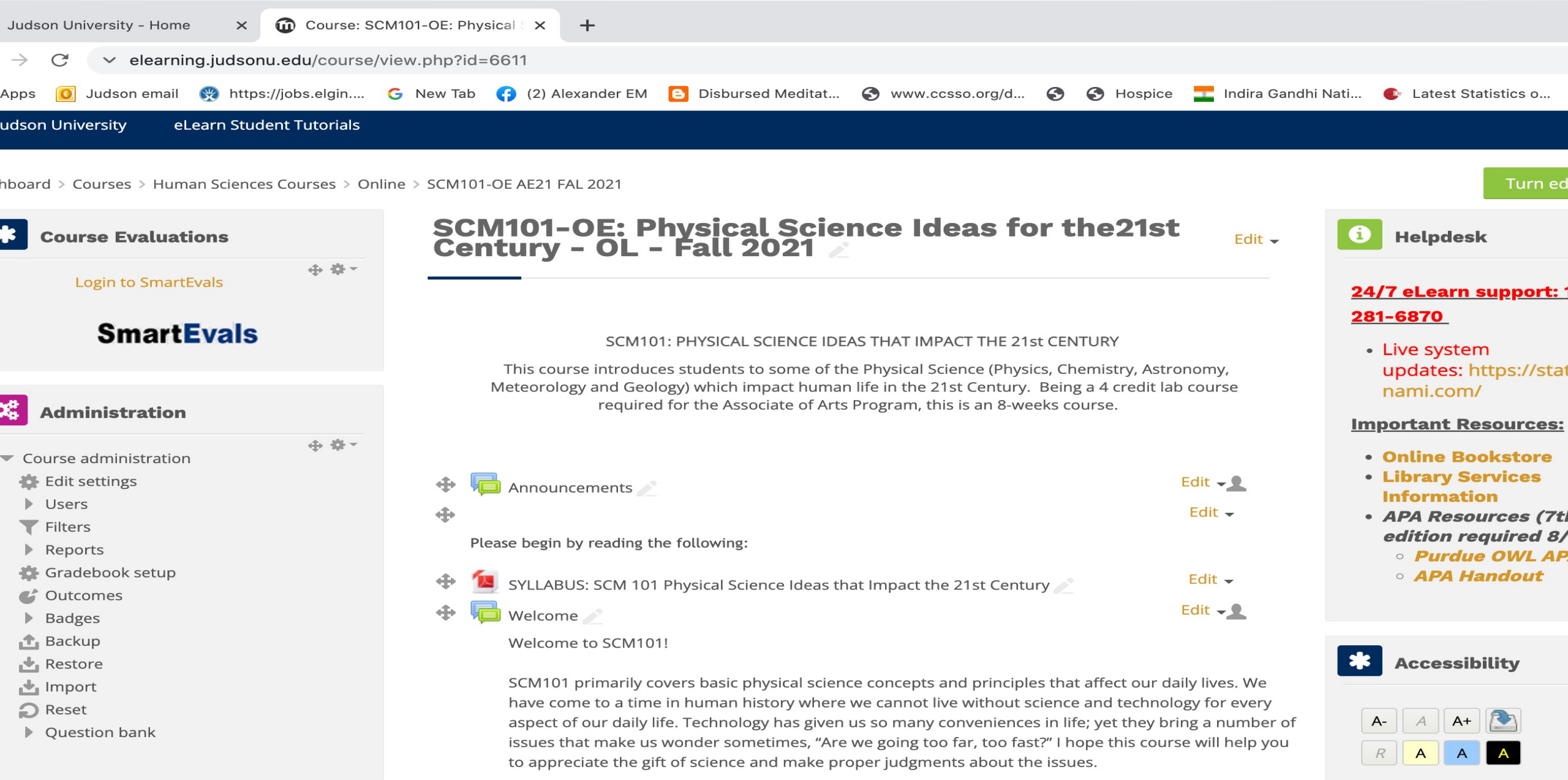
APPLICATIONS (CONTD)

7. Project-based learning/problem-based learning becoming popular in STEM education in schools. Tons of research and literature on the various aspects of project-based learning are available on the databases.
8. My own application (Undergrad project-based Geology course)
9. Physical Science AA Elearn course: f2f and online;-- blend of self-directed learning using web sources; project-based learning as final assessment, and application of the UDL model similar to David R.H's model—no prior knowledge
10. Show Elearn course site

SUMMARY OF 31-38

- Slides 31-33: Screen shots of the Elearn course site for SCM101 Physical Science Issues of the 21st century
- Slides 34-35: Authentic Summative Assessment Projects
- Slide 36: Work Contract
- Slide 37: Rubric
- Slide 38: Team Evaluation

SCM101 PHYSICAL SCIENCE COURSE SITE



What is Science? Edit

Unit 1 Notes Edit

Hewitt on Equilibrium Forces Edit

Equilibrium Rule: Watch this.

Aristotle and Galileo on Motion Edit

The gliding squirrell Edit

Einstein on God Edit

Course Participation Edit

Part of being in an accelerated program includes interaction with your instructor and/or fellow students outside of class. Activities and assignments that are included under "course participation" are required as part of your participation and attendance scores. You'll want to make sure that you are fully completing these exercises so as not to miss out on possible points or attendance credit.

Unit 1 Forum 1 Edit

Unit 1 Forum 2 Edit

Introduction Edit

Reach out to your team member(s) and find out pertinent information about him/her and introduce that person to your class on this forum.

Individual Assignments Edit

- Make sure you have reached out to your teammate about the final project.

Reading Quiz 1 Edit

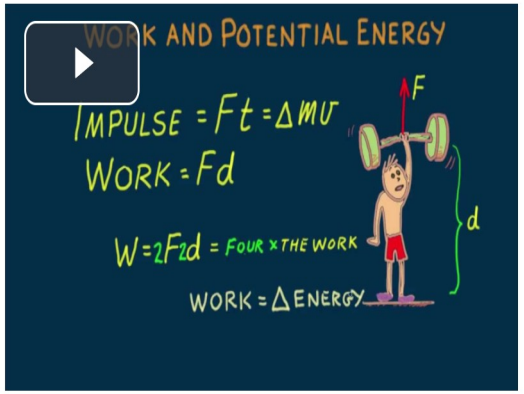
Journal 1 Edit

Lab 1 Power Lab Edit

You may do any or all your labs with team or family members. Take one or two pictures and post

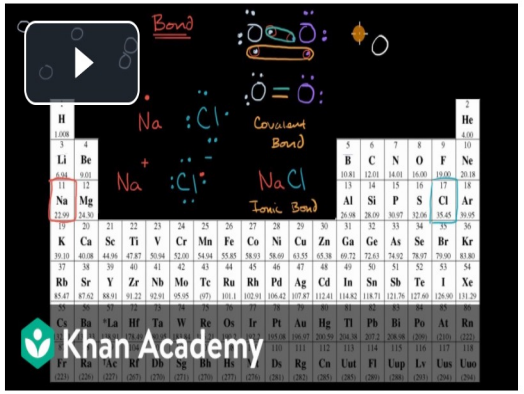
SCM101 COURSE SITE

Paul Hewitt, the lead author of *Conceptual Integrated Science* has short video clips on all the concepts in the textbook with the brand Hewitt-Drew It; Just type in Hewitt on , say Work.. See below. Edit



You may use these Youtube clips along with your readings for comprehending the concepts. Since these are readily available, it's easier for you to check them out as you need them.

The Khan Academy is another resource you can check out as well. Example:



. (Chemistry starts in Unit 4).

Recent activity

Activity since Sunday, 13 February 2022, 11:40 AM

Full report of recent activity...

No recent activity

Network servers

Judson Mahara

Add a block

Add...

SUMMATIVE ASSESSMENT: TAKE HOME PROJECTS

1. Where's the Moon?

Observe the shape of the moon and its position in the sky every quarter for one month. Present your observations of the moon using words, drawings, and graphs.

2. Length of Shadow

Measure the length of the shadow of an object four times each during five sunny days. Make charts and explain your observations.

3. **Volcanoes and People**

We have been hearing about disastrous volcano eruptions and lava flow in some parts of the world recently. This and other geological phenomena are described in chapter 27 of your textbook.

Make a media presentation of a documentary about life in a volcanic region, specifically, Kilauea volcano in Hawaii before and after its eruption

FINAL PROJECTS

4. **The Space Issue**

The National Geographic magazine's 2017 August, "The Space Issue" has several interesting articles on the ongoing Space Exploration. Choose any two of them *and* the article written by Scott Kelly about his Space station experience.

5. **Natural Disasters of 2021**

- Describe the following severe weather conditions which have created havoc in the US this summer (June-September, 2021):
- 1. Tornadoes. 2. Hurricanes 3. Flash floods. 4. Fire

WORK CONTRACT

- **SCM101: TeamWork Contract Template**:

Names of Team Members:

Name of the Project:

Work delineation:

Meeting/conference arrangements:

Signatures of Members:

RUBRIC

• SCM101: Team Presentation Rubric	5	4	3	2	1
Quality of Content 75%					
Research					
Depth					
Organization					
Writing Mechanics					
References					
Quality of visuals					
Presentation 25% **Member 1** **Member 2**					
Presentation style					
Professionalism					
Group work					

TEAM EVALUATION

Team Members should rate the performance and contribution of their partners to the group activity on a scale of 1-5, 5 being the highest. Your grade for the activity will reflect the average of the ratings your group partners give you. This should be done without mutual consultation.

Name of Activity:

Name of the Partner being rated:

	1	2	3	4
Mutual dependence				
Communication				
Quality of work done				
Accountability .				
Cooperation and				
Conflict resolution				

Your Name and Signature :

- Mutual dependence: Did the member consult with the rest of the group at critical points of the group activity and help in it with mind and body so that each of you will be at your best?
- Communication: Was the member prompt in responding to calls and ready to make adjustments to accommodate the others?
- Quality of work: How much work did the member do? How does it affect the overall quality of the group work? Was the information turned in on time for the completion of the work or did you have to remind several times?
- Accountability: Did the member respect the fact that he/she is accountable for the part given to him/her and act accordingly?
- Cooperation and conflict resolution: How were the member's disposition, attitude and overall professionalism in the activity?

CHECK IN POINT

- Discussion:

  How many of you have implemented UDL in part or in full in your adult classes?

  As adult and continuing educators, do you think UDL can be successfullyand fully implemented in your classes…virtual or f2f?

  What are the possibilities? What are the challenges?

  Q & A

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CONCLUSION

- Self-directed learning, self-regulated learning and universal design for learning are instructional methods to motivate and make learning available to learners of diverse abilities in our global classrooms, both real and virtual.