Lifelong Learning
Professional Development
ENGT-2000
“In the new economy, you graduate and you’re set for fifteen minutes. Working and learning are fast becoming the same activity.” — Don Tapscott, The Digital Economy

Technology and Education
Technology and Education

- As engineering professionals we deal with technology as a core part of our creative efforts.
- We are all aware of the increasing speed with which technology is changing and the challenge to educational institutions to respond to these changes with modifications to the curriculum.
- What we learn about technology in school today may (is likely to) be irrelevant tomorrow.
One View
Another View

The Obvious Conclusion

- As engineering professionals we cannot rely on educational institutions alone for our education.
- A formal education is only one step in the ongoing process of keeping current with the ever-changing technologies of our chosen discipline.
“Wisdom is not a product of schooling, but the lifelong attempt to acquire it.” – Albert Einstein

Learning
A Lifelong Activity
Learning

- According to TheFreeDictionary.com, the word “learn” is defined as “To gain knowledge, comprehension, or mastery of through experience or study.”

- Lifelong learning is described as “the provision or use of both formal and informal learning opportunities throughout people's lives in order to foster the continuous development and improvement of the knowledge and skills needed for employment and personal fulfillment.”
Lifelong Learning

Lifelong learning is defined as ‘all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective.’

– EU Lifelong Learning Programme
Information Literacy

Information literacy, which “is common to all disciplines, to all learning environments, and to all levels of education,” forms the basis for lifelong learning; it is an intellectual framework for recognizing when information is needed, and understanding, finding, evaluating, and effectively using such information.

Association of College and Research Libraries
So What Then?

- The central conclusion is that learning is not confined to what we do in school.
- We must continue to learn after our formal schooling is complete.
- We are responsible for the learning that takes place after formal schooling and for the remainder of our life … we must become information-literate lifelong learners.
- There is both a personal and professional dimension to our lifelong learning activities.
Lifelong Learners

A life-long learner is a person who is:

- Self-aware and reflective of their on-going learning needs.
- Self-assesses for knowledge and skill deficiencies and sets appropriate learning goals and tasks.
- Can find appropriate resources and learning opportunities.
- Understands their learning preferences and knows how to adapt them to maximize learning under different circumstances.
- Sufficiently motivated to do so.
Self-Directed Learning

- Self-directedness is probably the most important component of lifelong learning.
- Self-directedness relates to both recognizing a need for further learning as well as being proactive in gaining access to and accomplishing the desired learning.
Attributes of Self-Directed Learners

- Curious/motivated
- Methodical/disciplined
- Logical/analytical
- Reflective/self-aware
- Flexible
- Interdependent/interpersonally competent
- Persistent/responsible
- Venturesome/creative
- Confident
- Independent/self-sufficient
Skills of Self-Directed Learners

- Highly developed information seeking and retrieval skills.
- Knowledge about and skill at the learning process.
- Knowledge about learning styles and skill at employing them.
- Develop and use criteria for evaluating critical thinking.
Summary

- We must learn how to learn.
- We must learn how we learn.
- We must be proactive, active learners.
- We must be self-aware.
- We must recognize the gaps in our knowledge and identify ways to fill these gaps.
- We must be self-motivated and persistent.
“I have never let my schooling interfere with my education.” – Mark Twain
Continuing Education

- There is direction from the profession.

- Each discipline-related professional society has established a requirement for continuing education as part of a code of ethics.

- Engineers who have obtained PE registration must document annual educational activities to maintain the license. This requirement applies to the PE license but is appropriate to all engineering professionals.
A Professional Requirement

“Engineers shall continue their professional development throughout their careers and should keep current in their specialty fields by engaging in professional practice, participating in continuing education courses, reading in the technical literature, and attending professional meetings and seminars.”

– NSPE Code of Ethics
## CE Requirements for PEs

### Mandatory Continuing Education Requirements for Professional Engineers & Land Surveyors in Various US Jurisdictions

**Note:** States Not Listed Have No Mandatory Continuing Education Requirements  
PDH = Professional Development Hour, PDU = Professional Development Unit, CE = Continuing Education  
CPC = Continuing Professional Competency, CPD = Continuing Professional Development, HSW = Health, Safety and Welfare  
PE = Professional Engineer, SE = Structural Engineer, LS = Land Surveyor

<table>
<thead>
<tr>
<th>US State</th>
<th>License Renewal Cycle</th>
<th>Pre-approval Required?</th>
<th>PDH's Required</th>
<th>Allowed Max. PDH Carryover</th>
<th>License Renewal Deadline [Special CE Requirements: All required PDH can be taken online unless noted otherwise.]</th>
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</thead>
<tbody>
<tr>
<td>Ohio</td>
<td>Biennial</td>
<td>No</td>
<td>30</td>
<td>15</td>
<td>December 31, Odd Year [PE &amp; LS: Starting 2015, at least 24 out of 30 hours shall be from Timed &amp; Monitored courses or live webinars.]</td>
</tr>
</tbody>
</table>
| Michigan      | Biennial               | No                     | 30 for PE  
20 for LS  
18 for Dual Lic. | 15 for PE  
12 for LS  
18 for Dual Lic. | October 31, Odd Years (starting 2015)  
[PE: 13- to 24-month license holders need to complete just 15 PDHs at the time of first renewal.] |
| Minnesota     | Biennial               | No                     | 24              | 12                        | June 30, Even Years [Min. of 2 PDHs in Professional Ethics (starting 2016).] |
| Mississippi   | Annual                 | No                     | 15 for PE  
12 for LS  
18 for Dual Lic. | 15 for PE  
12 for LS  
18 for Dual Lic. | December 31  
[Must obtain 2 PDH's in ethics training every 2 years. Excess ethics PDH may not be carried forward.] |
| Missouri      | Biennial               | No                     | 30 for PE  
20 for LS  | 30 for PE  
20 for LS | PE: December 31, Even or Odd Year  
[LS course pre-approval program is available. PDH Online | PDH Center is a MO LS Board Approved Provider.] |
| Montana       | Biennial               | No                     | 30              | 15                        | June 30, Even Year |
| Nebraska      | Biennial               | No                     | 30              | 15                        | Based on the first letter of last name: A-K by December 31, Odd Year; L-Z December 31, Even Year [Max. of 7.5 PDHs can be taken on our websites.] |
| Nevada        | Biennial               | No                     | 30              | 15                        | Based on the first letter of last name: A-E by December 31, Even Year; F-K June 30, Odd Year; L-R December 31, Odd Year and S-Z June 30, Even Year. |
| New Hampshire | Biennial               | No                     | 30 for PE  
32 for LS  | 15 for PE  
16 for LS | Varies |

and related to HSW.
Ohio CE Requirements for PEs

Continuing Professional Development Activity Log

All CPD activities and hours must be relevant to the practice of engineering or surveying and include technical, ethical, or managerial content. This form is required for tracking your CPD hours for your Ohio P.E. and/or P.S. registration biennial renewal. This form does not replace copies of your certificates of completion or other documentation required by Ohio Revised Code section 4733.151. 30 CPD hours are required for Ohio registration renewal. A maximum carryover of 15 CPD hours is permitted for the next biennial renewal period. For information about the Board’s CPD requirements, go to our website at www.peps.ohio.gov.

<table>
<thead>
<tr>
<th>Name</th>
<th>P.E. number</th>
<th>P.S. Number</th>
<th>Year</th>
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<tbody>
<tr>
<td>Date</td>
<td>Sponsor/Provider</td>
<td>Address</td>
<td>Activity Title and Description</td>
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</tbody>
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AFFIDAVIT The CPD credits listed herein are true and correct, and accurately state the professional development hours I have earned.

This year’s CPD Hours

Previous year CPD Carry Over

TOTAL CPD HOURS
Appropriate Activities

- Should maintain, improve or expand skills and knowledge obtained prior to initial licensure or develop new and relevant skills and knowledge.
- Must be related to public health, safety, and welfare.
- Must enhance and expand skills and knowledge and abilities of practicing professional.
- May include technical, ethical, or managerial content.
- No personal improvement courses accepted.
“I don’t think much of a man who is not wiser today than he was yesterday.” – Abraham Lincoln
Not Just About Technology

- Use it or lose it.
- You CAN teach an old dog new tricks.

Dr. Michael Merzenich, a leader in the field of neuroplasticity research, claims that we can constantly change the structure of the brain and increase its capacity to learn. His research shows that if the brain is not challenged with new learning, the brain's function can gradually erode over time, leading to decreased memory and cognitive function.

http://www.scilearn.com/blog/lifelong-learning-brain-plasticity.php
Brain Health & Neural Plasticity

“Brain health is the result of a dynamic process in which a person engages in behaviors and environments to shape the brain toward a healthier existence.”

“For our purposes, neural plasticity shall refer to a brain that is dynamic, constantly reorganizing, and malleable.”

– Paul D. Nussbaum, Ph.D.
Brain Plasticity

- Gray matter can actually shrink or thicken; neural connections can be forged and refined or weakened and severed.

- Changes in the physical brain manifest as changes in our abilities.
  - Each time we learn a new dance step, it reflects a change in our physical brains: new "wires" (neural pathways) that give instructions to our bodies on how to perform the step.
  - Each time we forget someone's name, it also reflects brain change—"wires" that once connected to the memory have been degraded, or even severed. As these examples show, changes in the brain can result in improved skills or a weakening of skills.
Brain-Health Benefits

What we need:
- socialization
- physical activity
- mental stimulation
- Lifelong learning
Five Aspects of Brain Health

- **Nutrition**: Eat more “good” fats including Omega-3 fatty acids, more fruits and vegetables, and fewer “bad” fats and processed foods.

- **Socialization**: Stay involved with life and develop a personal mission and hobbies along with building networks of family and friendships.

– Paul David Nussbaum, Ph.D.
Five Aspects of Brain Health

- **Physical Activity:** Be mobile and active. Walk, play, run, garden, exercise, bike, hike. These activities can help reduce the risk of dementia later on in life.

- **Mental Stimulation:** Learn a second language, learn sign language, travel, play board games, and either play or listen to music.

-- Paul David Nussbaum, Ph.D.
Five Aspects of Brain Health

- **Spirituality:** Slow down, meditate, and learn relaxation procedures. Identify what your stressors are and how they affect you and then identify ways to handle them.

– Paul David Nussbaum, Ph.D.
Challenge Your Brain

- New brain cells could be formed and then could migrate to whatever area of the brain that they are needed in. This process of growth or regeneration in the brain is called neurogenesis.

- It was found that novel and challenging environments would in all creatures including man stimulate the division of these stem cells and produce the required neurons.

http://www.learning-knowledge.com/plasticity.html
Challenge Your Brain

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http://www.learning-knowledge.com/plasticity.html
Challenge Your Brain

- Neuroscience seems to indicate that new neurons are formed in the brain only when the organism is volitionally engaged in learning.

- What has become clear is that people who continue to learn throughout their lives are better protected against mental decline.

http://www.learning-knowledge.com/plasticity.html
"Once you stop learning, you start dying"

~ Albert Einstein ~

Your Plan
Changing Your View
Prepare your plan for Lifelong Learning

1. Find your learning style
2. Assess what you don’t know & what you need/want to know
   - Professionally
   - Personally
3. Plan how to go about learning & what you want to learn
Find Your Learning Styles

VARK

Take an assessment test to determine your style

From "The Index of Learning Styles," by Dr Richard Felder and Barbara Soloman.

<table>
<thead>
<tr>
<th>Style</th>
<th>Characteristics</th>
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</thead>
<tbody>
<tr>
<td>Sensory</td>
<td>Sensory learners prefer concrete, practical, and procedural information. They look for the facts.</td>
</tr>
<tr>
<td>Intuitive</td>
<td>Intuitive learners prefer conceptual, innovative, and theoretical information. They look for the meaning.</td>
</tr>
<tr>
<td>Visual</td>
<td>Visual learners prefer graphs, pictures, and diagrams. They look for visual representations</td>
</tr>
<tr>
<td>Verbal</td>
<td>Verbal learners prefer to hear or read information. They look for explanations with words.</td>
</tr>
<tr>
<td>Active</td>
<td>Active learners prefer to manipulate objects, do physical experiments, and learn by trying. They enjoy working in groups to figure out problems.</td>
</tr>
<tr>
<td>Reflective</td>
<td>Reflective learners prefer to think through, to evaluate options, and learn by analysis. They enjoy figuring out a problem on their own.</td>
</tr>
<tr>
<td>Sequential</td>
<td>Sequential learners prefer to have information presented linearly and in an orderly manner. They put together the details in order to understand how the big picture emerges.</td>
</tr>
<tr>
<td>Global</td>
<td>Global learners prefer a holistic and systematic approach. They see the big picture first and then fill in the details.</td>
</tr>
</tbody>
</table>
Assess what you need to know

Professionally:

- Observe what others know & do
  - Colleagues
  - Competitors
- Discover technological trends to learn
  - Go to trade shows and seminars
  - Read trade publications
- Review codes, standards & spec changes in industry
  - Attend professional society meetings
  - Network with others in the industry
Assess what you’d like to know

Personally:
- Look back on things you always wanted to do
- Investigate something that strikes you as interesting
- Learn about what your friends like to do try to do the same
- Try to keep up with technology
Approaches to Lifelong Learning

Professional:
- In-house Training/Seminars
- Conferences & Workshops
- Short Courses
- Webinars
- Professional Development Activities
- Part-time Graduate Courses
- Graduate School
- Professional School
- Self-directed Learning
Approaches to Lifelong Learning

Personal:

- Enroll in courses at your local adult education center
- Learn a new language, learn to dance
- Attend a play, act in a local play
- Learn how to play a new musical instrument
- Learn to draw, paint or sculpt
- Teach adults to read
- Do a variety of things, including things you aren’t good at
Approaches to Brain Health

INVESTING IN YOURSELF

- Take online courses
- Ask mentors
- Join seminars
- Read books
- Join groups
- Try