Date: Friday, March 23, 2018
Time: 10:00 a.m. to 2:00 p.m.
Location: Seminole State College, Oviedo Campus
Building F, Room OVF-100 (Building F Conference Center)

Agenda

I. Welcome and Introductions

II. Review Past Meeting Minutes

III. Follow-up on action items
   - Updated Syllabi for all courses

IV. Dynamics – Mandatory Topics & Assessment – Dr. Mohua Kar (VC)

V. Evaluation and Proficiency Center (EPC) @ UCF – Dr. Ron DeMara

VI. Review Topics/Subtopics and ABET Learning Outcomes
   - EGS 2610 / EGN 3613: Engineering Economic Analysis
   - EGS 2373 / EGN 3373: Principles of Electrical Engineering

VII. Lunch Break – 12:00pm (will be provided)

VIII. Next steps

IX. Set Fall Meeting Date & Identify Host

X. Adjourn

www.curriculumalignment.ucf.edu
The meeting began at 10:02 a.m.

PARTICIPANTS
Emilie Bottorff, UCF; Mark Calabrese, UCF; Joe Cho, UCF; Ronald DeMara, UCF; Teresa Dorman, UCF; Ron Eaglin, Daytona State College; Alyssa Foxson, Valencia College; Barry Gibson, Daytona State College; Kerry-Ann Gore, Valencia College; Mevlut Guvendik, Eastern Florida State College; Cecilia Larsson, Seminole State College; Saige Liparulo, Valencia College; Lisa Macon, Valencia College; Marino Nader, UCF; Harrison Oonge, UCF; Henry Regis, Valencia College; Chuck Reilly, UCF; Kirk Sawyer, Seminole State College; Kim Small, UCF; Angelia Smith, UCF; Erik Sweet, Daytona State College.

WELCOME / INTRODUCTIONS
Harrison Oonge welcomed attendees and then asked everyone to introduce herself or himself.

REVIEW OF PAST MEETING MINUTES
The minutes from the October 13, 2017 meeting were reviewed. Minor changes were made. A motion to approve the minutes was made by Chuck Reilly and seconded by Ron Eaglin. The minutes were approved unanimously.

FOLLOW-UP ON ACTION ITEMS
CA WEBSITE / ONLINE PORTAL
Harrison Oonge gave an overview of the Curriculum Alignment website. Harrison noted that there have been discussions across disciplines as to the idea of shared assessments. With this in mind, a secured online portal has been established on the CA website. This will allow faculty, advisors and staff to share curriculum related information securely and further the curriculum alignment initiative. If participants would like access to the online portal, they are to email Emilie Bottorff (emilie.bottorff@ucf.edu) to opt in and request access.

UCF’s PROPOSED BSMSE (BACHELOR’S OF SCIENCE IN MATERIALS SCIENCE & ENGINEERING)
Chuck Reilly gave an update on UCF’s proposed Bachelor’s of Science in Materials Science & Engineering. The proposed degree is scheduled for final review/approval by UCF’s District Board of Trustees in July 2018. If approved, the program will be available to students in Fall 2019.

DYNAMICS – MANDATORY TOPICS & ASSESSMENT
For your review, here is the link to the Engineering Learning Outcomes/Topics/Sub-topics Google sheet - https://docs.google.com/spreadsheets/d/1cFHTttP4nIrJ597MN7YfeIRCMD2YSvGvYodYtXsaiM/edit
In reviewing the learning outcomes for Engineering Analysis - Dynamics (EGN 2322 / EGN 3321), participants asked the question, “are we utilizing the same level of assessment across consortium institutions?” Discussion ensued. It was determined that cross referencing quizzes and exams would be beneficial in order to have a collective of faculty to review assessments and determine alignment. Mevlut Guvendik suggested sharing test bank questions if faculty are unable to share quizzes and/or exams in their entirety. Teresa Dorman suggested utilizing the online secure portal to share these assessments.

**ACTION:** Faculty to share quizzes and tests for Engineering Analysis - Dynamics (EGN 2322 / EGN 3321) and Engineering Analysis – Statics (EGN 2312/EGN 3310) courses for further discussion and posting to the online portal. Also share the overall final grade.

**EVALUATION AND PROFICIENCY CENTER (EPC) @ UCF – DR. RONALD DEMARA**

Ronald DeMara gave an overview of the Evaluation and Proficiency Center (EPC) at UCF. The Evaluation and Proficiency Center is a UCF College of Engineering and Computer Science learning facility dedicated to success in coursework and advancement of career skills. It focuses on self-paced and instructor-assisted exam review and skills development. Its facilities are available to students who are enrolled in courses with online evaluation components.

Dr. DeMara’s presentation is attached and below are the video links as well as his contact information.

**Video Links:**
UCF Evaluation and Proficiency Center (EPC) Virtual Tour
https://www.youtube.com/watch?v=tG2OtUXkpoY
Score Clarification: https://www.youtube.com/watch?v=Cu1eFS3hbhU

Dr. DeMara extended an invitation to faculty from the DirectConnect institutions to consider coming to the Faculty Development Workshop that will convene on Mondays of Summer A session on UCF Campus. The protocols that will be presented at the workshop are described here: http://cal.ucf.edu/journal/j_demara_CoED_2017.pdf. These protocols appeared in R. F. DeMara, B. Chen, R. Hartshorne, and R. Thripp, "Elevating Participation and Outcomes with Computer-Based Assessments: An Immersive Development Workshop for Engineering Faculty," ASEE Computers in Education Journal, Vol. 8, No. 3, pp. 1 – 12, July – September, 2017.

Anybody interested to participate in the Faculty Development Workshop should email Dr. DeMara through the contact information below.

**Contact Information**
Ronald F. DeMara, Ph.D.
Professor of Electrical and Computer Engineering, and joint faculty of Computer Science Topical Editor, IEEE Transactions on Computers Department of Electrical and Computer Engineering, UCF
Phone: 407-823-5916
E-mail: ronald.demara@ucf.edu
Web: http://cal.ucf.edu/

**REVIEW TOPICS/SUBTOPICS AND ABET LEARNING OUTCOMES**
**EGS 2610 / EGN 3613: ENGINEERING ECONOMIC ANALYSIS**

Mark Calabrese reviewed the topics, subtopics and learning outcomes EGS 2610/ EGN 3613: Engineering Economic Analysis. Mark completed the google doc with suggested mandatory topics, subtopics and learning outcomes. Participants reviewed Mark’s suggestions. Ron Eaglin noted that Daytona State College is utilizing a nearly identical course. It was suggested to have a faculty member from Seminole State College teaching to review the suggested topics, subtopics and learning out comes for EGS 2610/ EGN 3613: Engineering Economic Analysis to confirm articulation.
LUNCH BREAK WAS HELD FROM 12:30-1:30PM

EGS 2373 / EGN 3373: PRINCIPLES OF ELECTRICAL ENGINEERING
Faculty that teach EGS 2373 / EGN 3373: Principles of Electrical Engineering were not present during the March 23rd meeting. It was suggested that the review of topics, subtopics and learning outcomes for EGS 2373 / EGN 3373: Principles of Electrical Engineering be pushed to the fall 2018 meeting.

FOLLOW-UP FROM CURRICULUM ALIGNMENT CONFERENCE
Mevlut Guvendik reviewed the notes (see attached) he developed during the assessment discussion portion of the Curriculum Alignment Conference that was held on Friday, March 3, 2018.

Ron Eaglin reviewed Daytona State College’s (DSC) ABET course and program outcomes assessment for EGN 3613. Ron noted that DSC reviews its ABET course and program outcomes assessment on an annual basis. http://dscentdepartment.pbworks.com/w/page/53129007/ENT%20Course%20Outcomes

What data should be shared with administrators? How do we know the curriculum alignment work is improving student success?

- Perform year to year comparative analysis. Define the outcome. Define the population. Define courses taken. Ron Eaglin suggested that to assess alignment the focus should be on tracking the metrics of persistence, retention, and graduation rates of AA students who matriculate to UCF through DirectConnect. These metrics will be compared to general student groups.
- State colleges to advise students to enroll in the DirectConnect™ to UCF program to allow for data tracking. Advisors that were in attendance confirmed that they are advising students on enrolling into the DirectConnect™ to UCF program.

Faculty from Daytona, Eastern Florida State College, and Valencia, indicated that they can readily share names of students (directory information) to allow longitudinal tracking of student performance across institutions. UCF Connect will coordinate a follow-up with State College advisors to pursue collection of this information.

ACTION ITEMS / NEXT STEPS
- Send latest syllabi to Harrison Oonge (Harrison.oonge@ucf.edu) and copy Emilie Bottorff (emilie.bottorff@ucf.edu)
- Faculty to share sample quizzes and tests for further discussion and posting to online, secure portal. Email this information for the following courses to Emilie Bottorff (Emilie.bottorff@ucf.edu):
  - Engineering Analysis - Dynamics (EGN 2322 / EGN 3321)
  - Engineering Analysis – Statics (EGN 2312/EGN 3310)
- Email Emilie Bottorff (emilie.bottorff@ucf.edu) to opt in and request access to the secured portal.
- Participants to share current CA Engineering work with fellow faculty.
- Review EGS 2373 / EGN 3373: Principles of Electrical Engineering topics, subtopics and learning outcomes at the fall 2018 meeting.
- Share latest Engineering CA contact list with all participants (continue to include Math faculty for cross-disciplinary discussions).
- Follow-up with UCF Connect to coordinate identification of DC students who are declared in meta-majors/pre-majors and begin building longitudinal assessment of persistence, retention, and graduation.

SET FALL 2018 MEETING DATE AND IDENTIFY HOST
The fall 2018 Engineering Curriculum Alignment meeting is scheduled for Friday, October 5, 2018 from 10:00am – 2:00pm with University of Central Florida (Chuck Reilly) offering to host.

The meeting adjourned at 1:56pm.
Digitizing and Remediating Engineering Assessments

Concepts, Status, & Opportunities to Transform STEM Learning

Ronald F. DeMara, Ph.D.
Professor
Department of Electrical and Computer Engineering
ronald.demara@ucf.edu

23 March 2018, 10:30-11:00, Seminole State College

Marchioli Collective Impact Innovation:
"Recognizing transformative ideas advancing the university"
Why was the EPC Established / Expanded?

- “Develop a new standard for teaching facility design with measurable improvements in effectiveness.”
- Increase teaching support for STEM-specific needs
- Enable learning that scales with enrollment

Contemporary Engineering Assessment

- Low-gain activities
- Disconnected remediation
- Week+ turnaround
- Design Problems?
- Partial Credit?
- Handwritten Work?

New Standard: EPC

→ Instructional Technology + Remap Human Resources

Evaluation
120 Seats

Proficiency
30 Seats

- Auto-grading
- Convenience
- Integrity
- Statistics
- Rapid feedback
- Self-review & human in loop
- Raise soft-skills
Four Objectives of EPC Model

1) Increasing Student Engagement
   - re-fortify HW & exam impact

2) Serving Large Enrollments
   - hierarchy of assessment review

3) Elevating Learning Outcomes
   - tutoring, remediation, problem solving skills

4) Adopting Technology Incrementally
   - voluntarily, at right time, in right way

What’s changed in 2016:
- internet “solver” sites?
- course file repositories?
- social media/meetups?
- electronic duplication?
- hired contractors?

→ increase engagement & deep learning & diverse learning & retention
How to Engage Design Skills

**Project** → **Student**

EEL3801: Computer Organization
Summer 2014: Prof. DeMara
Project #3

Write a callable/returning MIPS subroutine called `BitDiff(x,y)`
Specifically, `BitDiff(x,y)` accepts two unsigned integers `x` and `y` as input parameters. It returns a single unsigned integer value. Specifically, the returned value is the number of bits which are different when `x` and `y` are written in binary. More formally, it is the number of bits which have different values in the corresponding bit positions of their 32-bit representation.

For example, `BitDiff(14,7) = 2` since:
- `14_{10} = 0000 0000 0000 0000 0000 0000 0000 1110` as 32 bits
- `7_{10} = 0000 0000 0000 0000 0000 0000 0000 0111` as 32 bits
- `Different? NNNN NNNN NNNN NNNN NNNN NNNN NNNN NNNN YNNY = 2 different`...

- written entirely from scratch so not available on internet
- 1 person-day to author assignment
- 1 person-day to code/test solution/rubric

**Why the EPC was established and/or expanded?**

- need to demonstrate skills without aides
Usage Over Time
7 Degree Programs & 24 Faculty in 2018

2014: EEL3801 Pilot
→ questions digitized

2015: ECE Pilot
→ pooled GTAs from 4 courses for collective impact

2016: ECE+IE Pilot
→ pooled GTAs from 6 courses

2016: 6-Week Faculty Development Summer Workshop #1

2016: Tech Fee $275K Proposal
→ 4x capacity for CECS-wide

2017: 120+30 Seat Facility

2017: 6-Week Faculty Development Summer Workshop #2

Teaching Value Harvested Annually $580,625
Recouped GTAs + Instructor Hours after expenses
Digitizing Engineering Assessments

What transfer students need to know?

Infrastructure: technology + human resources + services

Conventional

- Faculty
- Learner
- Grading Assistants

Focused Expertise

- Logistic Scalability
- Lecture

Learning Management System

- HWs
- Exams

Computerized Grading

- Grader_1
- Grader_n
- GTA

Evaluation & Proficiency Center (EPC)

- Socratic Discussions
- Tuning
- Discourse
- Exemplar
- Personalized

- Targeted Mentoring
- Video
- Tutor

- Measure
- Question
- Content Tutor
- Clone Composer
- Test Proctor

Infrastructure: technology + human resources + services

- Graduate Scholar Assistants
What transfer students need to know?
What transfer students need to know?
Four Objectives of EPC Model

1) Increasing Student Engagement
   - re-fortify HW & exam impact

2) Serving Large Enrollments
   - hierarchy of assessment review

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   - tutoring, remediation, problem solving skills

4) Adopting Technology Incrementally
   - voluntarily, at right time, in right way

What’s Changed:
- 1993: 2+2 load
- 2018: 2+2 load

→ 1) GTAs to gainful roles
   2) Lecturing to Facilitating & Tuning
BLUESHIFT Remediation Hierarchy
specializing on the tasks at which we are good at

1. Content Tutoring (open 9am-6pm)
   - drag-and-drop → Study Set, EPC Tutoring, EPC quiz
   - GTAs provide first-responder support in a learning hierarchy for grading concerns.
   - one-on-one solving examples of Lecture & Study Sets in EPC
   - soft skill development via one-on-one technical dialog
     - GTAs provide first-responder support in a learning hierarchy for grading concerns.
     - clone prototypes and compose solutions
     - hold office hours in EPC to deliver engineering design guidance and debugging
     - turnkey high-integrity exam delivery

2. Learning Outcome Analysis
   - identify class-wide learning effectiveness
   - refine materials for open & closed formats
   - one-on-one solving examples of Lecture & Study Sets in EPC
   - soft skill development via one-on-one technical dialog

3. Curriculum Tuning & Prototyping
   - undergraduate library of learning content can be accessed based on their own time, and at their own pace
   - refined materials for open & closed formats
   - drag-and-drop → Study Set, EPC Tutoring, EPC quiz
   - one-on-one solving examples of Lecture & Study Sets in EPC
   - soft skill development via one-on-one technical dialog

1. Question Bank Repository
   - spend time studying and demonstrate skills without aides present

2. Flexible Time Access
   - undergraduate library of learning content can be accessed based on their own time, and at their own pace

EPC Manager
- Website & IT Development
- Exam Scheduling
- GSA Management
- Security/Compliance
- SDS & Make-up & Scheduling Exceptions

GSAs
- (Graduate Scholar Assistants)

Self-Paced

UCF Proprietary Information
Copyright © 2016 Ronald F. DeMara
# EPC Course Delivery – as of Sept 2017

23 CECS Faculty Trained / Using EPC

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Last Name</th>
<th>Dept.</th>
<th>Course</th>
<th>Max Annual Enroll.</th>
<th>GTA Hours Harvested</th>
<th>GTA Contracts Harvested</th>
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<tr>
<td>1</td>
<td>Batarseh (used 2016, full 2018)</td>
<td>ECE</td>
<td>EEL3004: Electrical Networks</td>
<td>420</td>
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<td>6</td>
<td>Tian</td>
<td>MAE</td>
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<tr>
<td>7</td>
<td>Turgut</td>
<td>CS</td>
<td>COP 4331: Proc. Object Oriented SW</td>
<td>300</td>
<td>15</td>
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<td>Wisniewski</td>
<td>IT</td>
<td>CAP 3xxx/4104: Human &amp; Tech Interaction</td>
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<td>9</td>
<td>Wu</td>
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<td>COP 3223: Intro Program w C</td>
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<td>Vosoughi</td>
<td>ECE</td>
<td>EEL3004: Electrical Networks</td>
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<td>Above</td>
<td>Above</td>
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<td>23</td>
<td>Young</td>
<td>IT / ECE</td>
<td>CNT3004: Computer Networks (F17) and EGN3373 (Sp18)</td>
<td>270 + 350</td>
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<td>Unknown</td>
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Best Case of All Semesters Adoption:
Teaching Value Harvested $650,000 (GTAs) + Instructor Hours

Total:
11,332
520
26
High Integrity with Learner Convenience
- proctored room, ID confirmation, search engines disabled, camera deterrents
- no unauthorized materials, no internet search, no collaboration, no phones, no skyping
- quiet, spacious, clean, and uniform environment

Testing Effect: Increases Student Engagement
- active content, adaptive learning, personalizable
- can “enforce” a review period and monitor review completion

Provides New Functionalities
- randomized content: questions & values
- additional question formats for CDS skills
- insightful statistics including time-on-task

Offers Instructor Support and Flexibility
- turnkey delivery
- anytime makeup exams
- paperless logistics: no photocopies and no miscoded / lost sheets, fewer disputes
- zero-effort regrading of questions during or after release
- can restrict access to exam content → eliminate annual “re-creation effort”
Digitization Initiatives in CECS
turnkey approaches demonstrated in some courses

Four Goals of EPC Model

1) Increasing Student Engagement
   - re-fortify HW & exam impact

2) Serving Large Enrollments
   - hierarchy of assessment review

3) Elevating Learning Outcomes
   - tutoring, remediation, problem solving skills

4) Adopting Technology Incrementally
   - voluntarily, at right time, in right way

What’s challenging our learners:

- bimodal prerequisite base
- skills to formulate, solve, & explain a problem

→ open tutoring & “score clarification”
Students Assisted: Tutoring & Exam Prep.
1,048 tutoring sessions in initial academic year

- 6 or more visits: 36%
- 4 to 5 Visits: 33%
- 2 to 3 Visits: 7%
- 1 visit: 7%
- Did not use: 17%

and more sign-in sheets!

via realignment of grader and faculty roles to focus expertise
Evaluation and Proficiency Center (EPC) Coordination of Operation

1) Evaluation

- Flexible scheduling
- Quiet environment
- Rubrics identified
- Immediately graded

Students

- Turnkey testing
- Comprehensive statistics
- Regain class time
- No gradebook time

Faculty

2) Proficiency “advancement in knowledge or skill”

- Individual Feedback, Tutoring, Socratic Methods

Students schedule

Time slots to review results

GSAs & Faculty

- 1-on-1 review with GTA
- Self-paced, tutoring-on-demand, or fully tutored

Students

Focus identified

3) Faculty: meet with students

- Topics identified to meet with faculty in office hours / in-class time
- Faculty time for assistance is focused and effective, and rewarding!
Evaluation and Proficiency Center (EPC)
Rapid Remediation = “Score Clarification” Process
### Student Perceptions & Learning Gains

**Summative Learning Gains:**
EPC outperformed paper-based cohort by +5.4%, +6.9% and +16.9%

### Scalability with Enrollment

**Human Resources Breakeven**
- 3 proctors
- 6 proctors max

**EPC Savings**
- $0k
- $100k
- $200k
- $300k
- $400k
- $500k
- $600k
- $700k
- $800k
- $900k

**Cost:**
- Conventional
- EPC

### Summative Assessment

<table>
<thead>
<tr>
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<th>PBA Cohort Mean</th>
<th>CBA Cohort Mean</th>
<th>Achievement Increase</th>
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<tbody>
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<td><strong>Heat conduction equation</strong></td>
<td>70.9%</td>
<td>74.7%</td>
<td>+5.4%</td>
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<tr>
<td></td>
<td>N 57</td>
<td>58</td>
<td></td>
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<tr>
<td><strong>Steady heat conduction</strong></td>
<td>70.8%</td>
<td>70.5%</td>
<td>-0.5%</td>
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<tr>
<td></td>
<td>N 57</td>
<td>58</td>
<td></td>
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<tr>
<td><strong>Heat Transfer from finned surfaces</strong></td>
<td>62.7%</td>
<td>67.0%</td>
<td>+6.9%</td>
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<tr>
<td></td>
<td>N 58</td>
<td>54</td>
<td></td>
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<tr>
<td><strong>External forced convection</strong></td>
<td>59.3%</td>
<td>69.3%</td>
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Learning Outcomes
EPC vs Conventional Delivery

EGN3211: Engineering Analysis and Computation

- two sections of 70 students each
- junior-level course with emphasis on C programming
- study using same course, same instructor, same semester:
  - one section utilizing EPC-based delivery
  - one using conventional delivery

Benefit to course grades

- 6.3% increase in cumulative scores
- 43% reduction in grades of D or F going into the final exam

EPC-based delivery improved quiz scores

- 4 quizzes of 50 minute duration
- 9.8% improvement average score
- 34.3% reduction in grades of D or F

EPC-based delivery exam results

- 2 exams of 75 minute duration
  - Exam 1: comparable scores
  - Exam 2: 5.9% grade improvement for EPC-based delivery
  - 58.3% reduction in F’s (section crosstalk?)
Reduction in DFW
EPC vs Conventional Delivery EGN3211 Spring 2015

Quiz 1
- 16.7% grade improvement
- 29.4% reduction in grades of D or F
- No-shows: Conventional = 1, EPC = 0

Quiz 2
- 7.1% grade improvement
- 45.5% reduction in grades of D or F
- No-shows: Conventional = 2, EPC = 0

Quiz 3
- 13.9% grade improvement
- 50% reduction in grades of D or F
- No-shows: Conventional = 3, EPC = 1

Quiz 4
- 3.9% grade improvement
- 25.9% reduction in grades of D or F
- No-shows: Conventional = 3, EPC = 4

Quiz 5
- 7.2% grade improvement
- 20.5% reduction in grades of D or F
- No-shows: Conventional = 2, EPC = 2
Score Clarification Efficacy
Student Perceptions via IRB-Approved Anonymous Surveys

“The score clarification process has contributed positively to my learning.”

109 out of 118 students responding
CBA Efficacy
Student Perceptions via IRB-Approved Anonymous Surveys

“In this course specifically, computerized questions are adequate to evaluate engineering problem-solving skills comparing to conventional exams.”

100 and 109 out of 118 students responded to the pre- and post-surveys, respectively.
Learner Perceptions
Impact and Repeatability

Fall 2015 & Fall 2016: N=68 to 112

(a) “Study Sets followed by computerized assessment are more effective for learning than Homework.”
(b) “In this course, computerized questions were adequate to evaluate engineering design skills.”
(c) “Graduate assistant guided access to quiz results enhanced my comprehension of material.”
(d) “The use of a testing center provided an adequate testing environment compared to paper exams.”

Figure 4.4: (a) “Study Sets followed by computerized assessment are more effective for learning than Homework.”
(b) “In this course, computerized questions were adequate to evaluate engineering design skills.”
(c) “Graduate assistant guided access to quiz results enhanced my comprehension of material.”
(d) “The use of a testing center provided an adequate testing environment compared to paper exams.”
Digitization Initiatives in CECS

Digitizing STEM

turnkey approaches demonstrated in some courses

Four Aspirational Goals of STEM Instruction

1) Increasing Student Engagement
   - re-fortify HW & exam impact

2) Serving Large Enrollments
   - hierarchy of assessment review

3) Elevating Learning Outcomes
   - tutoring, remediation, problem solving skills

4) Adopting Technology Incrementally
   - voluntarily, at right time, in right way

What’s Changed:
- 2015: 4 courses w/ EPC
- 2018: 24 courses w/ EPC

→ 1) Create faculty workshop
   2) Offer each summer
### Assessment Digitization Innovation (ADI) Workshop

#### Related Efforts

<table>
<thead>
<tr>
<th>Approach</th>
<th>Type</th>
<th>Degree Programs</th>
<th>Features</th>
</tr>
</thead>
</table>
| BYU’s TC         | Testing Center (TC)                       | Physics and Astronomy, Mechanical Engineering         | - Questions are symbolic to facilitate partial credit  
|                  |                                           |                                                       | - Equations not given, but constants provided                                                                                           |
| Univ. Utah’s TC  | TC                                        | Chemistry                                             | - Item Response Theory to identify difficulty                                                                                           |
| UIUC’s CBTF      | Digitized Assessment Tools & TC           | Computer Science, Mechanical Engineering              | - Interactive graphical response interface  
|                  |                                           |                                                       | - Unlimited retakes with highest score retained                                                                                         |
2) Defining ADI Workshop Content

ADI Workshop Title: "Digitizing and Remediating STEM Assessments"

**Audience:** Ten instructors of undergraduate gateway courses

**Objective:** Elevate pedagogical conceptions and assessment instruments

**Approach:** Impart strategies for computer-based testing of quizzes/exams with integrated tutoring approaches

**Format:** 6-Week faculty development in Summer as mixed-mode

**Motifs:** High tech classroom, electronic chat, immersive, peer-to-peer

<table>
<thead>
<tr>
<th>Wk</th>
<th>Mode</th>
<th>Participation Activity / Submission</th>
<th>Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Online</td>
<td>Course Logistics: Syllabus, Policies, Background, Instructor Profiles</td>
<td>2 hours</td>
</tr>
<tr>
<td>1</td>
<td>F2F</td>
<td>BLUESHIFT Pedagogy: Digitized Course Walkthrough, <strong>EPC Procedures</strong>, Study Set on SI units, Schedule EPC Quiz Appointment using website</td>
<td>4 hours</td>
</tr>
<tr>
<td>2</td>
<td>F2F</td>
<td>Modularization Planning: EPC Experience, BLUESHIFT paper, <strong>Immersive QUIZ IN EPC</strong></td>
<td>6 hours</td>
</tr>
<tr>
<td>3</td>
<td>Online</td>
<td>Exemplar Vignettes and <strong>Score Clarification</strong>: Vlogger Paper [18], read Peer Review, EPC Policies &amp; Procedures, <strong>Syllabus Starter with EPC Guidelines</strong>, Laboratory Digitization [19]</td>
<td>4 hours</td>
</tr>
<tr>
<td>4</td>
<td>F2F</td>
<td>Structuring Creativity/Design/Soft (CDS) questions: <strong>Question Development Flow</strong>, Canvas Quizzes Tool, <strong>GSA Panel Discussion</strong>, Respondus</td>
<td>6 hours</td>
</tr>
<tr>
<td>5</td>
<td>Online</td>
<td>Support Resources: Fellin Paper on Multiple Choice in STEM, Canvas Guide, Managing Academic Integrity &amp; Honesty, IRB—Approved Research, Screencasting Procedures, Hybrid Modality Lecture Capture Procedures</td>
<td>4 hours</td>
</tr>
<tr>
<td>6</td>
<td>F2F</td>
<td><strong>Showcase and Graduation</strong>: Enrollees present Quiz and Study Set, Course concludes with overview of Automated Extraction of Question Content</td>
<td>14 hours</td>
</tr>
</tbody>
</table>

Total 40 hours
Digitized Assessment: Design a Component → Design-by-Selection

Connection options

Given: The ALU design and Gate Choices List below.

Partial Credit 1: Which single device from the Gate Choices List is required in box A?
Answer 1: [Blank] Note: type ONLY the LETTER of the choice

Partial Credit 2: Which single device from the Gate Choices List is required in box B?
Answer 1: [Blank] Note: type ONLY the LETTER of the choice

Partial Credit 3: If the device in box C is a single 2-input XNOR gate, then indicate the required input pair below:
- a) \( F = \text{NOR}(c_2, \overline{c_1}) \) with \( G = \text{NOR}(c_1) \)
- b) \( F = \{c_3, \overline{c_1}\} \) with \( G = \{c_3\} \)
- c) \( F = \text{NOR}(c_3, \overline{c_1}) \) with \( G = \{c_3, \overline{c_1}\} \)
- d) \( F = \text{MSB of adder output} \) with \( G = \text{MSB of adder output} \)
- e) \( F = \text{LSB of adder output} \) with \( G = \text{LSB of adder output} \)
- f) none of the choices listed

Answer 2: [Blank] Note: type ONLY the LETTER of the choice

Answer 1: [Blank]
Digitized Assessment: Partial Credit → Multiple Dropdowns showing statistics

**Student Quiz View**

**Faculty Post-Quiz View**

Given: C-language statement below. Assume the value `A` is contained in `St1`. Assume the base address of the integer array `C` is contained in `Ss1`.

\[ A = (2 + [C[4]]) \ll 3, \]

Sought: Indicate the missing items needed to complete the corresponding MIPS code below:

- 6 partial credit scores to design the solution
- each `[x]` becomes a dropdown list for students
- can write code fragments, design voltage divider, select components for design

### Instructions:

#### Instruction Type:

| [X1] | $t2, [X2][Ss1] |
| [Y1] | [Y2][Y3][Y4] |

Statistics provided to instructor
5) Score Clarification
Self-motivates Learners to Review Missed Questions

Given: An athlete drank exactly 737.0 liters of Gatorade over an interval of 3.0 years.
Sought: How many milliliters of Gatorade did this athlete drink daily on average?

Note: Express your answer to the nearest single decimal point, i.e. 0.1 mL.

Correct Answer

673.1000

673.1 margin of error +/- 0.2

DEVELOPERS NOTES:
Formula format questions are IDEAL for:
1) randomizing for anti-gossiping or what I call anti-crosstalk (high integrity delivery via anti-cheating better than 2 live sections or one live section where they look at each others papers), and
2) automatically allow for a range of valid possibilities, i.e. a year could be 365, 365.25, or 365.2422 days, etc. So no matter which the student uses the question pre-scores all cases as correct by selecting margin below.

SOLUTION:
Please see Study Set 1 and the corresponding video where the material on SI units was presented in class. For this question,
Let the amount that the athlete drank in total be denoted as T.
Thus, the athlete consumed A = (T / (number of years)) liters of gatorade annually.
Thus the athlete consumed D = (A/365) liters of gatorade daily. (or more precisely D = A/365.25 due to leap years)
So since there are 1000 mL in each L, then the athlete drinks (D*1000) mL daily on average.
Elements anticipated to **impact your course in beneficial ways**:

- convenience compared to traditional assessment delivery: 85.7%
- increased understanding of areas to remediate: 85.7%
- honing of soft skills via Socratic clarifications: 28.6%
- time savings for faculty/GTAs: 100.0%
- improved ability to serve large enrollments: 85.7%
- increased integrity of assessment delivery: 57.1%
- increased learning outcomes: 57.1%