



Assessment Report:	Quantitative Reasoning Report
Assessment Period:	Academic Year 2022
Prepared by:	Dr. Suzie Park, Special Assistant to the Provost on Student Learning Dr. Grant Sterling, General Education Coordinator

The following report presents: 1) the General Education Committee’s implementation of a **Quantitative Reasoning Survey** for faculty and 2) data from the three most recent cycles of the **National Survey of Student Engagement (NSSE)** administered at Eastern Illinois University.

Part I: Quantitative Reasoning Survey

In Spring 2022, EIU implemented an assessment of Quantitative Reasoning (QR) skills in students (see **Appendix 1**). The assessment took the form of a questionnaire delivered to all instructors who taught sections of courses in the segment of the General Education curriculum entitled “Quantitative Reasoning in Scientific Awareness,” courses which teach the elements of quantitative reasoning that are specified in the survey itself.

When EIU implemented Quantitative Reasoning as a University Learning Goal, six sub-goals were identified. For all questions, instructors are asked to evaluate their students’ QR skills with regard to a particular sub-goal (except Question 7, which asks for an holistic evaluation of QR in general) on a scale from Very High (4) to Very Low (1). Instructors also had the option to indicate that the sub-goal was not part of their particular course’s learning goals.

The table below indicates the sub-goals, the mean instructor response, and the percentage of instructors who indicated that the sub-goal was a learning goal in the course.

Sub-goal	Mean	Identified as course goal
Performing basic calculations and measurements	2.5	100%
Applying quantitative methods and using the resulting evidence to solve problems	2.2	100%
Reading, interpreting, and constructing tables, graphs, charts, and other representations of quantitative material	2.5	100%
Critically evaluating quantitative methodologies and data	2.3	100%
Constructing cogent arguments utilizing quantitative material	2.0	67%
Using appropriate technology to collect, analyze, and produce quantitative materials	2.5	33%
EIU graduates produce, analyze, interpret, and evaluate quantitative material	2.5	100%

Given several factors—including the low response rate (3 respondents), lack of comparison data for past years, and little variation in the scores for the different sub-goals—we can reach only a few conclusions from the data:

- 1) Scores were surprisingly low, given that instructors were reporting the success of their own students at the end of the course. With 2.5 being an average score, no sub-area was ranked as above average, and three of the six fell below.
- 2) Instructors apparently do not focus on having students use technology to produce quantitative materials.
- 3) Sub-goals involving reading the data and performing basic calculations scored more highly than goals that involved critical analysis of the strength of the data.

This instructor survey is an interim instrument of assessment. The General Education Committee has formed a Task Force to create a new instrument that will directly test student skills, rather than relying on instructor impressions. This new instrument should be ready by Fall 2023.

Part II: NSSE data on students' quantitative reasoning

This report presents and compares data that describes **students' quantitative reasoning** from the “**NSSE Frequencies and Statistical Comparisons**” Reports of 2013, 2017, and 2020. Data are collected from **first-year students** and from **seniors**. As noted above, the General Education Committee has created a faculty survey, but is also working on developing a new framework for assessing students' quantitative reasoning.

First-Year Students

<i>Survey year</i>	Response rate	Sampling error	Total respondents	Full completions
2013	16%	+/- 6.4%	199	133
2017	32%	+/- 5.4%	223	173
2020	26%	+/- 4.7%	326	229

Seniors

<i>Survey year</i>	Response rate	Sampling error	Total respondents	Full completions
2013	23%	+/- 4.4%	381	293
2017	37%	+/- 4.3%	328	256
2020	30%	+/- 4.7%	300	252

First-year students and seniors answered the following question on the NSSE survey:

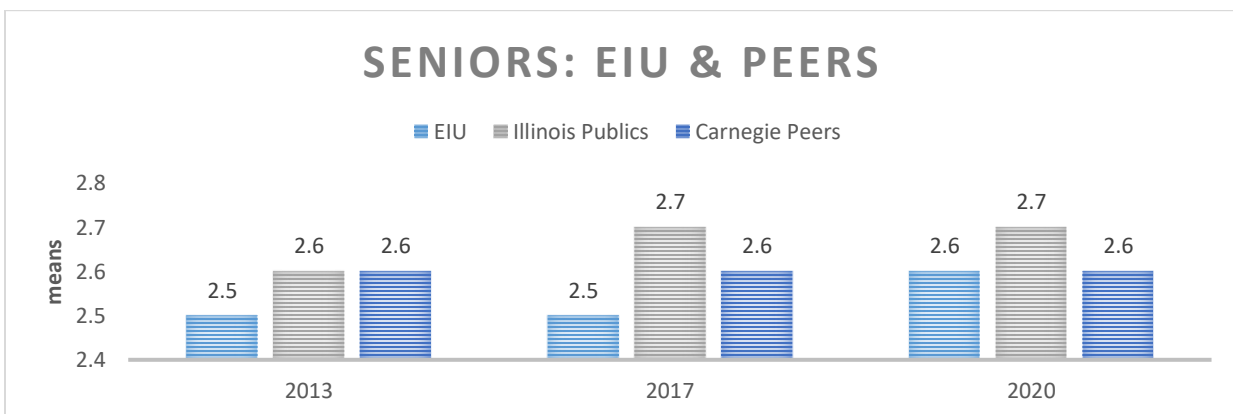
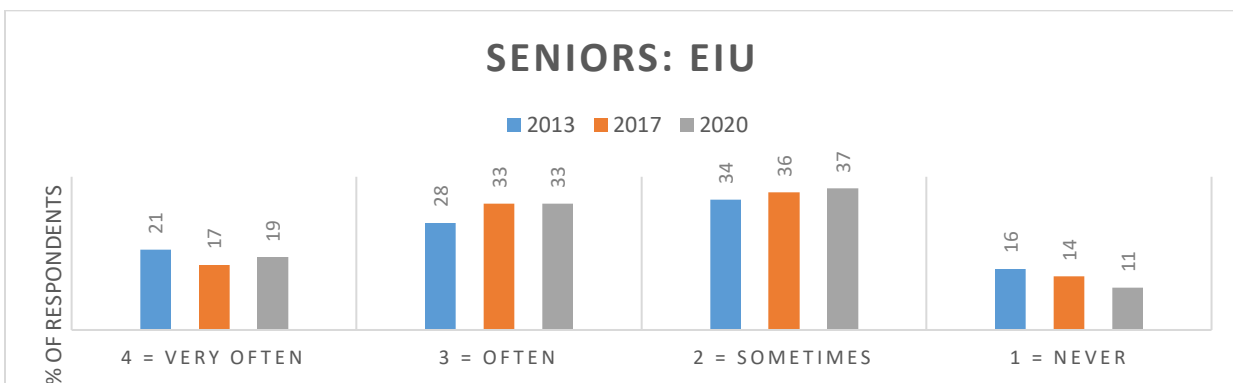
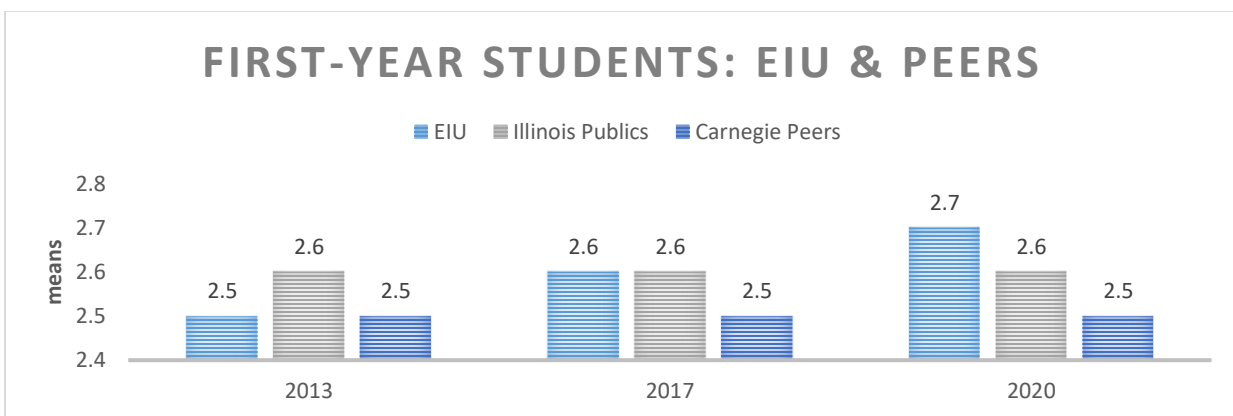
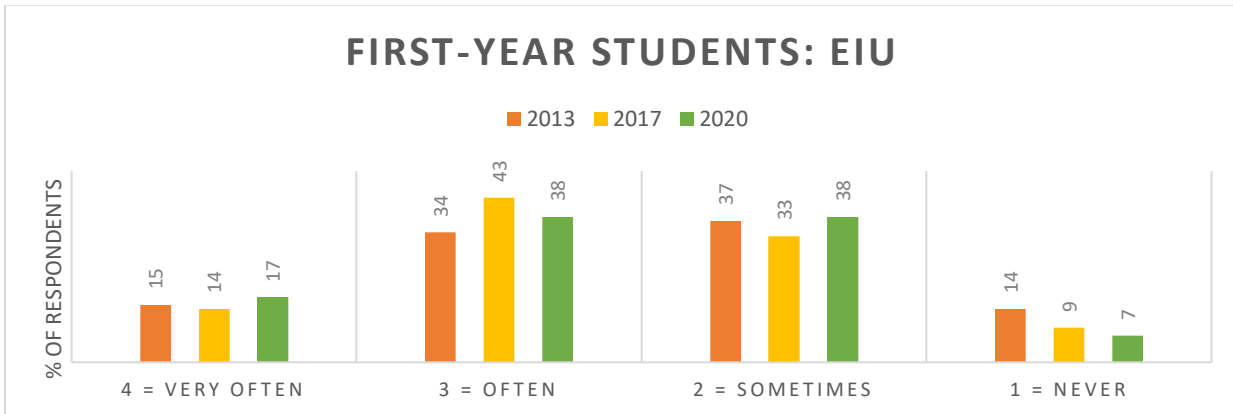
6. During the current school year, about how often have you done the following?

- A) Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.)
- B) Used numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)
- C) Evaluated what others have concluded from numerical information

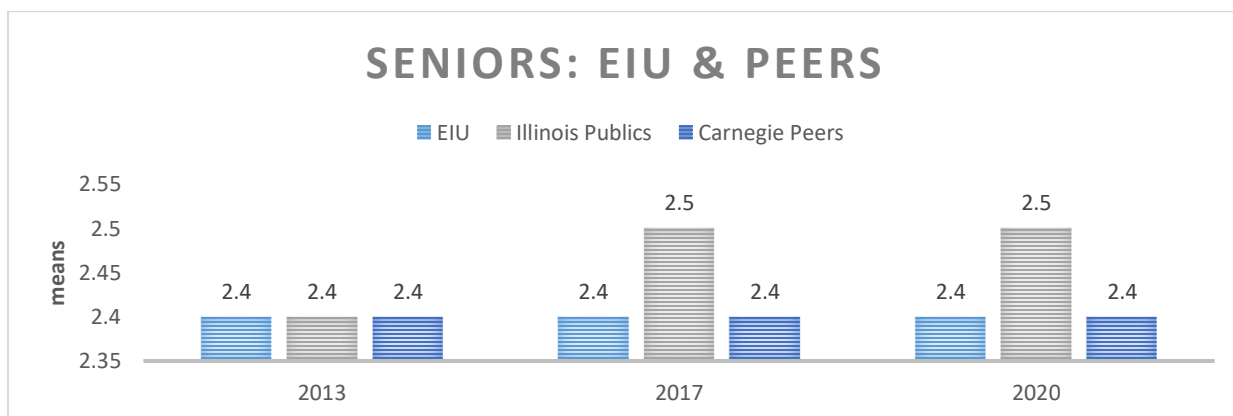
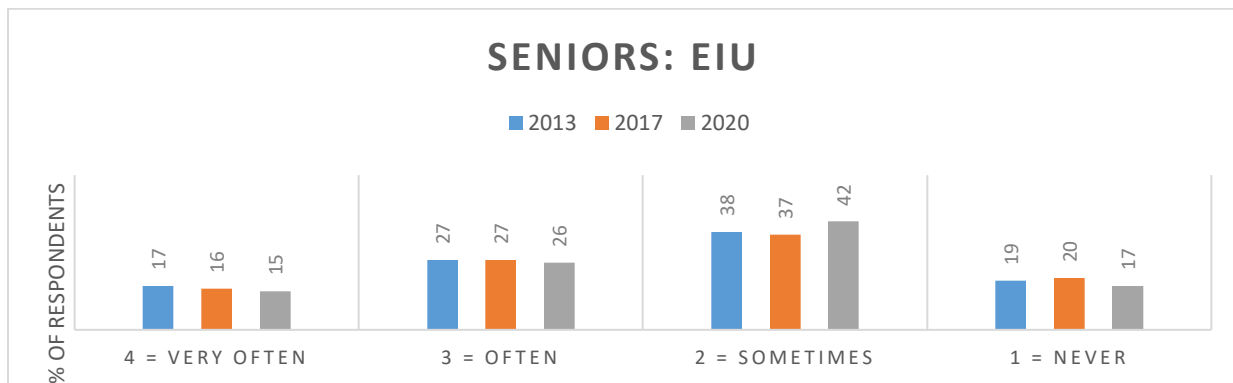
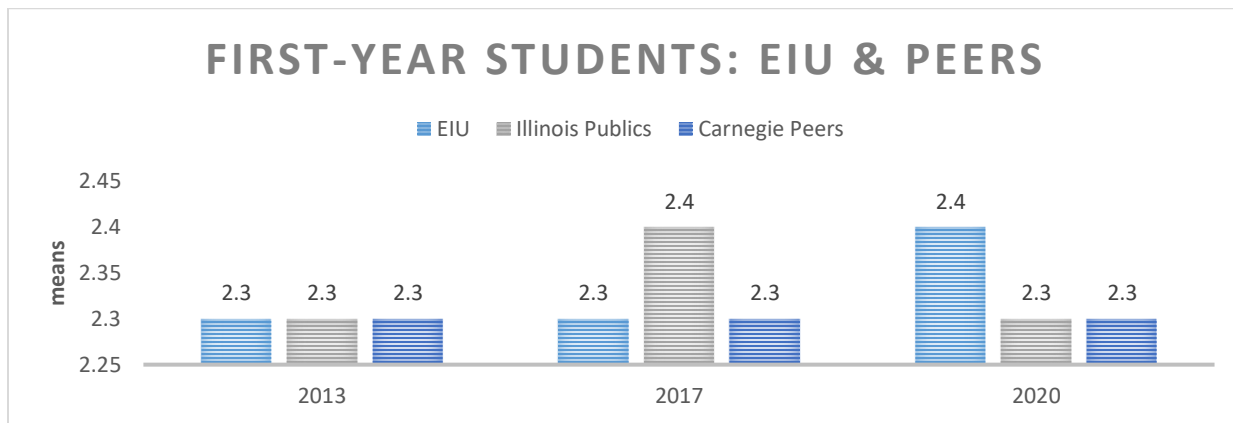
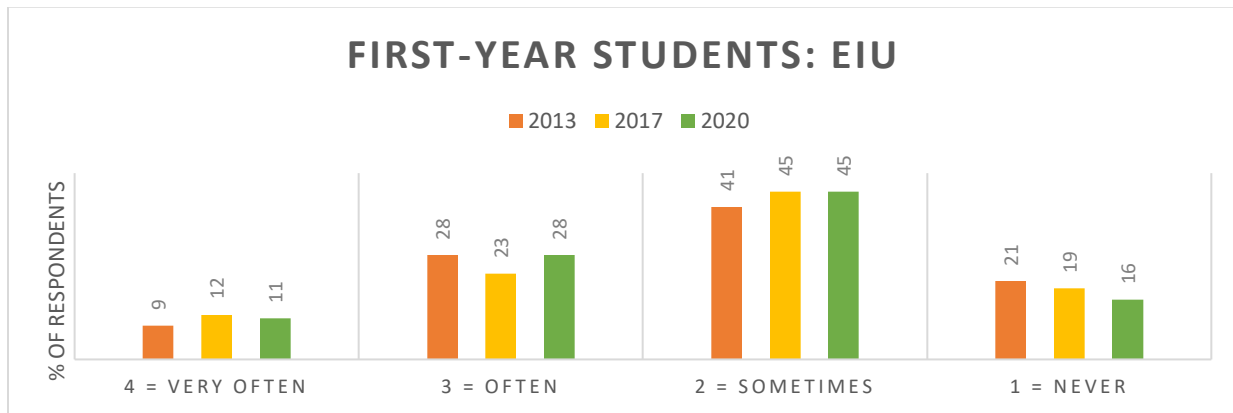
The survey asks students about their use of numerical information, during the current school year. Specifically, they are asked to describe how often—if ever—they reach conclusions, examine problems, and evaluate the conclusions of others via numerical information.

In the charts below, “peer institutions” indicates similarly-sized public, master’s degree-granting institutions. See **Appendix 2** for a specification of peer institutions.

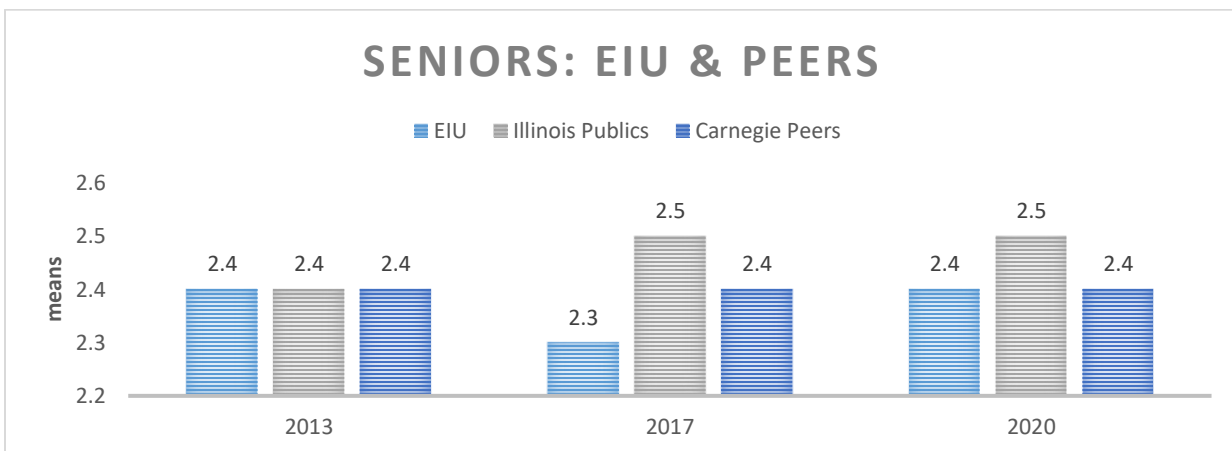
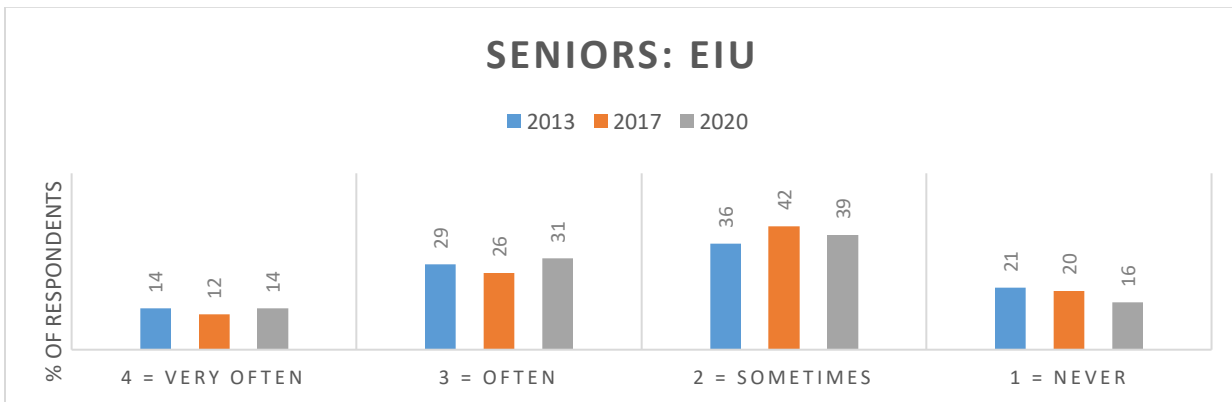
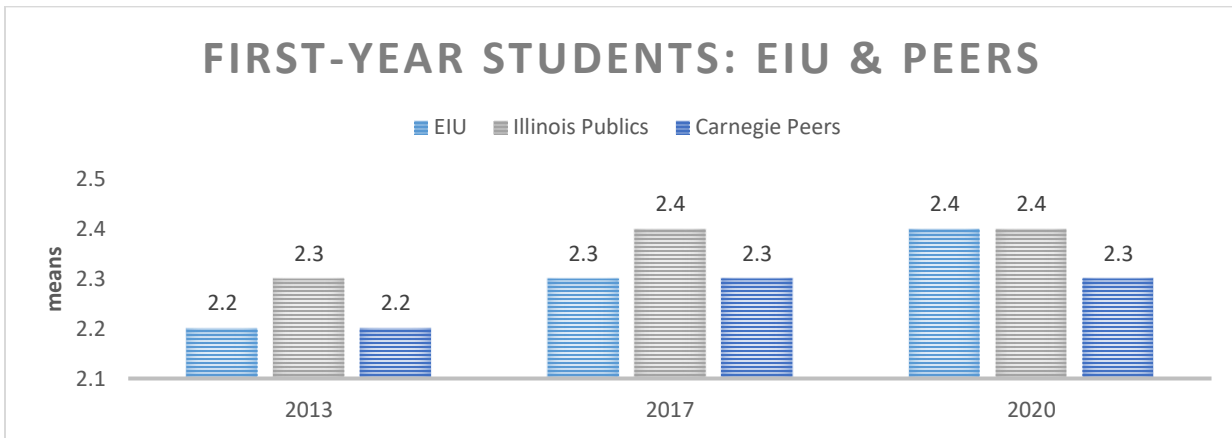
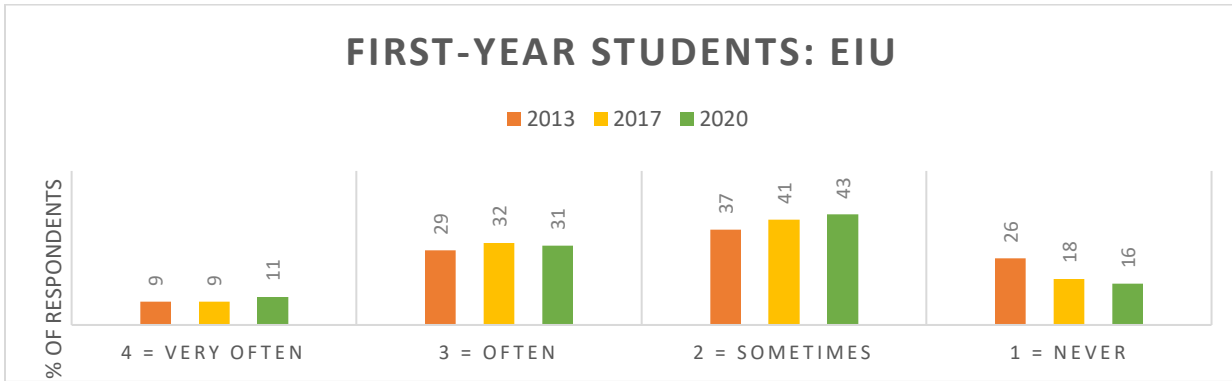
A) Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.)



B) Used numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)



C) Evaluated what others have concluded from numerical information



Conclusions

At EIU:

- **EIU first-year students** have shown moderate increases in interactions with numerical information over the period 2013-2020 in each of the three categories.
- **EIU Seniors** have maintained stable numbers for each of the categories over the period, with a moderate increase in reaching conclusions using numerical information.

Comparisons to peer institutions specified in the appendix:

There are **no statistically significant differences** between results in Quantitative Reasoning at the first-year or senior level at EIU and public institutions in Illinois (UIUC, UIC, ISU, etc.) or Carnegie peer institutions.

EIU has shown only improvement in all categories of quantitative reasoning.

- Approximately **65% (2020)** vs. 57% (2017) of EIU freshmen and **52% (2020)** vs. 50% (2017) of EIU seniors indicate they have reached conclusions based on their own analysis of numerical information **often or very often**.
- **Two percent more EIU seniors** (41%) than EIU freshmen (39%) indicate that within their coursework they have used numerical information to examine real-world problems often or very often. These percentages reflect trends at Carnegie peer institutions. The percentage of students at each level indicating they have **never** done this in classes **has fallen 3% since 2017** to 16% and 17% for first-years and seniors, **compared to higher percentages** at IL publics and peer institutions (18% and 19%).
- **More students in 2020** indicate they had often or very often evaluated what others have concluded from numerical information than in 2017: first-years rising to 42% (2020) vs. 41% (2017), and seniors to 45% (2020) vs. 38% (2017). In 2020, only 16% of first-year and senior students indicate they have **never done this in classes**, decreasing from 18% and 20% of EIU first-years and seniors in 2017, continuing a decrease from 2013 at both levels.

APPENDIX 1

Quantitative Reasoning Survey

I am the instructor of _____ (course name and number)

This assessment is based on the course I taught in _____ (semester)

During the semester listed, I taught _____ sessions of this course.

The total number of students enrolled in the sessions is _____ .

Q1. Considering the course as a whole and based on my assessment, the competence of my students in “Performing basic calculations and measurements” (first learning goal of Quantitative Reasoning) is:

- A. Very high
- B. Somewhat high
- C. Somewhat low
- D. Very low
- E. Subgoal not part of the course learning goals

Q2. Considering the course as a whole and based on my assessment, the competence of my students in “Applying quantitative methods and using the resulting evidence to solve problems” (second learning goal of Quantitative Reasoning) is:

- A. Very high
- B. Somewhat high
- C. Somewhat low
- D. Very low
- E. Subgoal not part of the course learning goals

Q3. Considering the course as a whole and based on my assessment, the competence of my students in “Reading, interpreting, and constructing tables, graphs, charts, and other representations of quantitative material” (third learning goal of Quantitative Reasoning) is:

- A. Very high
- B. Somewhat high
- C. Somewhat low
- D. Very low
- E. Subgoal not part of the course learning goals

Q4. Considering the course as a whole and based on my assessment, the competence of my students in “Critically evaluating quantitative methodologies and data” (fourth learning goal of Quantitative Reasoning) is:

- A. Very high
- B. Somewhat high
- C. Somewhat low
- D. Very low
- E. Subgoal not part of the course learning goals

Q5. Considering the course as a whole and based on my assessment, the competence of my students in “Constructing cogent arguments utilizing quantitative material” (fifth learning goal of Quantitative Reasoning) is:

- A. Very high
- B. Somewhat high
- C. Somewhat low
- D. Very low
- E. Subgoal not part of the course learning goals

Q6. Considering the course as a whole and based on my assessment, the competence of my students in “Using appropriate technology to collect, analyze, and produce quantitative materials” (sixth learning goal of Quantitative Reasoning) is:

- A. Very high
- B. Somewhat high
- C. Somewhat low
- D. Very low
- E. Subgoal not part of the course learning goals

Q7. Considering the course as a whole and based on my assessment, the competence of my students to “EIU graduates produce, analyze, interpret, and evaluate quantitative material” is:

- A. Very high
- B. Somewhat high
- C. Somewhat low
- D. Very low

APPENDIX 2

NSSE selected comparison groups

Illinois Publics = University of Illinois system schools, plus Governors State

For 2013, no “Illinois Publics” data was specified. For purposes of comparison, this report uses NSSE data for the following institutions: Eastern Michigan U, Illinois State U, Indiana State U, Iowa State U, Michigan State U, SIU-Carbondale, SIU-Edwardsville, U Wisconsin-Whitewater, and Western Michigan U

Carnegie Peers = Master’s-granting public universities

For 2017, no “Carnegie Peers” data was specified. For purposes of comparison, this report uses NSSE data for the following 29 institutions: Chicago State U, Eastern Kentucky U, Ferris State U, Governors State U, Indiana U East, Lincoln U, Missouri State U-Springfield, Murray State U, Northeastern Illinois U, Northern Michigan U, Northwest Missouri State U, Saginaw Valley State U, Truman State U, U Central Missouri, U Illinois-Springfield, U Michigan-Dearborn, U Michigan-Flint, U Saint Francis-Fort Wayne, U Southern Indiana, U Wisconsin (UW)-Oshkosh, UW-Eau Claire, UW-Green Bay, UW-La Crosse, UW-Platteville, UW-River Falls, UW-Stevens Point, UW-Stout, UW-Whitewater, Western Illinois U