

General Education  
Yearly Program Assessment (YPA)  
2020 - 2021 Plan, Project, Report, Budget  
2021-2022 Assessment Plan  
Submitted Spring 2021

1. Academic Program Leader: Jennifer Sherman
2. Academic Program Mission Statement: The overarching goal is to impart and develop skills that allow graduates to flourish and make life-long contributions to their professional, civic, and social world regardless of discipline, major, or career path.
3. Location(s) where Goals are Implemented: Minot; Online
4. Resources: [Assessment Terminology](#); [Assessment Basics](#)

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# Assessment Cycle Informative Table – Plan AY2020-2021

(Goals/Outcomes, Methodology,

Target)

## ALL STUDENT LEARNING GOALS AND OUTCOMES, METHODS, AND TARGETS

Goals/Outcomes	Methods	Target
<p>Student Learning Goals (Include the outcomes(s) and objectives underneath the respective goal, as applicable.)</p>	<p>Describe the Assessment Methods (Indicate whether instrument is direct or indirect)</p>	<p>Expected Outcomes, <b>i.e.</b>, Benchmarks for Success</p>
<p><b>Critical Capacities Skills 1:</b> Problem solving requires students to demonstrate the ability to raise vital questions and problems, formulating them clearly and precisely.</p> <p>SLO 1: Students will demonstrate the ability to state a problem/question.</p> <p>SLO 2: Students will demonstrate the ability to determine solutions associated with the problem/question.</p> <p>SLO 3: Students will demonstrate the ability to evaluate evidence associated with the solutions.</p> <p>SLO 4: Students will demonstrate the ability to select and defend the best solution for the problem/question.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS1 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Critical Capacities Skills 2:</b> Information literacy requires students to demonstrate the ability to locate, evaluate, select and assess relevant information, use abstract ideas to interpret information effectively, and come to well-reasoned conclusions and solutions.</p> <p>SLO 1: Students will demonstrate the ability to determine the nature and extent of information needed.</p> <p>SLO 2: Students will demonstrate the ability to access needed information effectively and efficiently.</p> <p>SLO 3: Students will demonstrate the capacity to evaluate information and its sources critically.</p> <p>SLO 4: Students will demonstrate individually, or as a member of a group, the ability to use information effectively in order to accomplish a planned objective.</p> <p>SLO 5: Students will demonstrate the ethical and legal use of information.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS2 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	

Goals/Outcomes	Methods	Target
<p><b>Critical Capacities Skills 3:</b> Critical reading requires students to demonstrate the ability to think open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences.</p> <p>SLO 1. Students will demonstrate the ability to recognize possible implications of a text beyond the author’s overt message.</p> <p>SLO 2. Students will demonstrate the capacity to evaluate a text according to its scholarly contributions and consequences.</p> <p>SLO 3. Students will demonstrate the ability to engage in reading as part of a continuing dialogue within and beyond a discipline or community of readers.</p> <p>SLO 4. Students will demonstrate the capacity to discuss texts, verbally and in written form, with an independent intellectual perspective</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS3 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Critical Capacities Skills 4:</b> Quantitative literacy requires students to demonstrate the ability to think open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences.</p> <p>SLO1: Students will demonstrate the ability to analyze and interpret quantitative information.</p> <p>SLO2. Students will demonstrate the capacity to critically analyze the limitations and bias of quantitative information.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS4 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Critical Capacities Skills 5:</b> Oral/written communication requires students to demonstrate the ability to communicate effectively with others when figuring out solutions to complex problems.</p> <p>SLO 1. Students will demonstrate competent content development and organization.</p> <p>SLO 2. Students will demonstrate the appropriate use of sources and evidence.</p> <p>SLO3. Students will demonstrate the use of syntax, grammar, and delivery appropriate for discipline and audience.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS5 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	

Goals/Outcomes	Methods	Target
<p><b>Critical Capacities Skills 6:</b> Collaboration requires students to demonstrate the ability to communicate effectively with others when figuring out solutions to complex problems.</p> <p>SLO 1. Students will demonstrate the ability to compromise and handle alternative viewpoints.</p> <p>SLO 2. Students will demonstrate the ability to build consensus among group members.</p> <p>SLO 3. Students will demonstrate the ability to identify group member strengths and utilize them appropriately.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS6 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Personal and Social Responsibility 1:</b> Relationships and value systems requires students recognize their relationships to communities and evaluate different value systems associated with community issues.</p> <p>A. Relationships</p> <p>SLO 1. Students will demonstrate the ability to recognize their relationships to communities.</p> <p>B. Value Systems</p> <p>SLO 2. Students will demonstrate the ability to evaluate different value systems associated with community issues.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> PSR1 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Personal and Social Responsibility 2:</b> Responding to community needs requires students respond to community needs by engaging in meaningful community activities.</p> <p>SLO 1. Students will demonstrate engagement in meaningful community activities.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> PSR2 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Personal and Social Responsibility 3:</b> Individual well-being requires students exercise individual well-being by exploring and practicing healthy behaviors.</p> <p>SLO 1. Students will demonstrate the exploration and practice of healthy behaviors.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> PSR3 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Interconnecting Perspectives 1:</b> Interconnecting perspectives: knowledge requires students demonstrate through coursework an understanding of diversity both globally and within the United States. The work product must serve to assess student</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> IP1 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	

Goals/Outcomes	Methods	Target
<p>knowledge of classifications of diverse groups and populations. In addition, the product must serve to assess the student's knowledge of the characteristics of at least one diverse population or group within the global community.</p> <p>SLO 1. Students will demonstrate knowledge of cultural self-awareness.</p> <p>SLO 2. Students will demonstrate knowledge of cultural worldview frameworks.</p> <p>SLO 3. Students will demonstrate curiosity about other cultures.</p>		
<p><b>Interconnecting Perspectives 2:</b> Interconnecting perspectives: experience requires students demonstrate through an applied experience an understanding of diversity both globally and within the United States. The work product must serve to assess students' understanding of diversity related to complex social issues, decisions and consequences. They should be able to draw upon and consider an increasingly diverse set of scientific, historical, cultural, and social perspectives to frame their arguments and should employ multiple ways of thinking about problems to both evaluate and respond to alternative viewpoints</p> <p>SLO 1. Students will demonstrate knowledge of cultural self-awareness.</p> <p>SLO 2. Students will demonstrate empathy and will recognize intellectual and emotional dimensions of more than one worldview.</p> <p>SLO 3. Students will demonstrate openness in their interactions with other cultures.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> IP2 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	

# Assessment Cycle Informative Table – Project (Gather, Review, Discuss)

2020-2021 Data Analysis

Student Learning Goals & Outcomes	<b>Gather, Review, &amp; Discuss</b> Gather, share, and interpret findings & indicate whether target was met or not met.
<p><b>CCS 1:</b> Problem solving requires students to demonstrate the ability to raise vital questions and problems, formulating them clearly and precisely.</p> <p><i>SLO 1.</i> Students will demonstrate the ability to state a problem/question.</p> <p><i>SLO 2.</i> Students will demonstrate the ability to determine solutions associated with the problem/question.</p> <p><i>SLO 3.</i> Students will demonstrate the ability to evaluate evidence associated with the solutions.</p> <p><i>SLO 4.</i> Students will demonstrate the ability to select and defend the best solution for the problem/question.</p>	<p>Both the parametric and non-parametric tests agreed, indicating that the tests were significant. There was a significant difference between the seniors and freshmen. There were also significant differences between juniors and freshmen, and between sophomores and freshmen respectively. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, our goal was met. For the actual data see the relevant section in the appendix.</p>
<p><b>CCS 2:</b> Information literacy requires students to demonstrate the ability to locate, evaluate, select and assess relevant information, use abstract ideas to interpret information effectively, and come to well-reasoned conclusions and solutions.</p> <p><i>SLO 1.</i> Students will demonstrate the ability to determine the nature and extent of information needed.</p> <p><i>SLO 2.</i> Students will demonstrate the ability to access needed information effectively and efficiently.</p> <p><i>SLO 3.</i> Students will demonstrate the capacity to evaluate information and its sources critically.</p> <p><i>SLO 4.</i> Students will demonstrate individually, or as a member of a group, the ability to use information effectively in order to accomplish a planned objective.</p> <p><i>SLO 5.</i> Students will demonstrate the ethical and legal use of information.</p>	<p>Both the parametric and non-parametric tests agreed, indicating that the tests were significant. There was a significant difference between the seniors and freshmen. However, neither the difference between freshmen and sophomores nor the difference between freshmen and juniors was significantly different. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, our goal was met. For the actual data see the relevant section in the appendix.</p>
<p><b>CCS 3:</b> Critical reading requires students to demonstrate the ability to think open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences.</p> <p><i>SLO 1.</i> Students will demonstrate the ability to recognize possible implications of a text beyond the author’s overt message.</p> <p><i>SLO 2.</i> Students will demonstrate the capacity to evaluate a text according to its scholarly contributions and consequences.</p>	<p>Both the parametric and non-parametric tests agreed, indicating that the tests were significant. There was a significant difference between the seniors and freshmen. There were also significant differences between juniors and freshmen, and between sophomores and freshmen respectively. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, our goal was met. For the actual data see the relevant section in the appendix.</p>

<p><i>SLO 3.</i> Students will demonstrate the ability to engage in reading as part of a continuing dialogue within and beyond a discipline or community of readers.</p> <p><i>SLO 4.</i> Students will demonstrate the capacity to discuss texts, verbally and in written form, with an independent intellectual perspective</p>	
<p><b>CCS 4:</b> Quantitative literacy requires students to demonstrate the ability to think open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences.</p> <p><i>SLO 1.</i> Students will demonstrate the ability to analyze and interpret quantitative information.</p> <p><i>SLO 2.</i> Students will demonstrate the capacity to critically analyze the limitations and bias of quantitative information.</p>	<p>There was no significant difference between freshmen and any other group (freshmen v. seniors; freshmen v. juniors; freshmen v. sophomores). Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, we note that there is a lack of evidence that our goal was met. For the actual data see the relevant section in the appendix.</p>
<p><b>CCS 5:</b> Oral/written communication requires students to demonstrate the ability to communicate effectively with others when figuring out solutions to complex problems.</p> <p><i>SLO 1.</i> Students will demonstrate competent content development and organization.</p> <p><i>SLO 2.</i> Students will demonstrate the appropriate use of sources and evidence.</p> <p><i>SLO 3.</i> Students will demonstrate the use of syntax, grammar, and delivery appropriate for discipline and audience.</p>	<p>No significant difference between seniors and freshmen was found. There were, however, significant differences between juniors and freshmen and sophomores and freshmen, respectively with freshman scoring higher in both cases. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data, we note there is lack of evidence that our goal was met. See the relevant section in the appendix for actual data.</p>
<p><b>CCS 6:</b> Collaboration requires students to demonstrate the ability to communicate effectively with others when figuring out solutions to complex problems.</p> <p><i>SLO 1.</i> Students will demonstrate the ability to compromise and handle alternative viewpoints.</p> <p><i>SLO 2.</i> Students will demonstrate the ability to build consensus among group members.</p> <p><i>SLO 3.</i> Students will demonstrate the ability to identify group member strengths and utilize them appropriately.</p>	<p>Both the parametric and non-parametric tests agreed, indicating that the tests were significant. There were significant difference between the seniors and freshmen and juniors and freshmen respectively. There was no significant difference between sophomore and freshmen. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, our goal was met. For the actual data see the relevant section in the appendix.</p>
<p><b>PSR 1:</b> Relationships and value systems requires students recognize their relationships to communities and evaluate different value systems associated with community issues.</p> <p><i>A. Relationships</i></p> <p><i>SLO 1.</i> Students will demonstrate the ability to recognize their relationships to communities.</p> <p><i>B. Value Systems</i></p>	<p>There was a single significant difference between juniors and freshmen. There was no significant difference between seniors and freshmen and sophomores and freshmen respectively. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, we note that there is a lack of evidence that our goal was met. For the actual data see the relevant section in the appendix.</p>

<p><i>SLO 2.</i> Students will demonstrate the ability to evaluate different value systems associated with community issues.</p>	
<p><b>PSR 2:</b> Responding to community needs requires students respond to community needs by engaging in meaningful community activities. <i>SLO 1.</i> Students will demonstrate engagement in meaningful community activities.</p>	<p>Both the parametric and non-parametric tests agreed, indicating that the tests were significant. There were significant difference between the seniors and freshmen and juniors and freshmen respectively. There was no significant difference between sophomore and freshmen. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, our goal was met. For the actual data see the relevant section in the appendix.</p>
<p><b>PSR 3:</b> Individual well-being requires students exercise individual well-being by exploring and practicing healthy behaviors. <i>SLO 1.</i> Students will demonstrate the exploration and practice of healthy behaviors.</p>	<p>There was no significant difference between freshmen and any other group (freshmen v. seniors; freshmen v. juniors; freshmen v. sophomores). Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, we note that there is a lack of evidence that our goal was met. For the actual data see the relevant section in the appendix.</p>
<p><b>IP 1:</b> Interconnecting perspectives: knowledge requires students demonstrate through coursework an understanding of diversity both globally and within the United States. The work product must serve to assess student knowledge of classifications of diverse groups and populations. In addition, the product must serve to assess the student’s knowledge of the characteristics of at least one diverse population or group within the global community. <i>SLO 1.</i> Students will demonstrate knowledge of cultural self-awareness. <i>SLO 2.</i> Students will demonstrate knowledge of cultural worldview frameworks. <i>SLO 3.</i> Students will demonstrate curiosity about other cultures.</p>	<p>Both the parametric and non-parametric tests agreed, indicating that the tests were significant. There were significant difference between the seniors and freshmen and juniors and freshmen respectively. There was no significant difference between sophomore and freshmen. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, our goal was met. For the actual data see the relevant section in the appendix.</p>
<p><b>IP 2:</b> Interconnecting perspectives: experience requires students demonstrate through an applied experience an understanding of diversity both globally and within the United States. The work product must serve to assess students’ understanding of diversity related to complex social issues, decisions and consequences. They should be able to draw upon and consider an increasingly diverse set of scientific, historical, cultural, and social perspectives to frame their arguments and should employ multiple ways of thinking about problems to both evaluate and respond to alternative viewpoints.</p>	<p>Both the parametric and non-parametric tests agreed, indicating that the tests were significant. There was a significant difference between the seniors and freshmen. There were also significant differences between juniors and freshmen, and between sophomores and freshmen respectively. Although the committee will make recommendations at the end of this report regarding desired targets, when considering this data we operated on the assumption that if there were a positive significant difference between freshmen and seniors, our goal was met. For the actual data see the relevant section in the appendix.</p>



<p><i>SLO 1.</i> Students will demonstrate knowledge of cultural self-awareness.</p> <p><i>SLO 2.</i> Students will demonstrate empathy and will recognize intellectual and emotional dimensions of more than one worldview.</p> <p><i>SLO 3.</i> Students will demonstrate openness in their interactions with other cultures.</p>	
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# Assessment Cycle Informative Table – Report and Implementation)

(Recommendations

2020 - 2021 Data Analysis

Student Learning Goals & Outcomes	
<b>Data Recommendation</b>	<ul style="list-style-type: none"> <li>▪ The Institutional Research Director should assist in the compilation of data and production of graphs, charts, and tables following agreed upon data analysis tests for the sake of consistency</li> <li>▪ Collect course level data. The rubric question could be, “What class level is your course? Please choose 100 for 95 courses.” Rubric menu response choices would be 100, 200, 300, or 400.</li> <li>▪ Data collection necessary for IP2 pilot: See IP2 Proficiency-Based Assessment Model Pilot Proposal and April 15th, 2021, Faculty Senate Meeting Minutes documents in the appendix.</li> </ul>
<b>Program Recommendation</b>	<ul style="list-style-type: none"> <li>▪ A proficiency-based model should be piloted as a comparison against the current growth model. We have chosen to pilot this approach with IP2 as IP2 has been a problematic area of Developmental Content since our first cycle of data. Additionally, this proficiency-based model should be independent of coursework to assess the General Education model. The targets should be changed to match this pilot model.</li> <li>▪ Endorse the Ad Hoc Gen Ed committees’ recommendation to rename Developmental Content Categories. See Final-Ad_Hoc_GenEd_report_to_Senate and April 15th, 2021, Faculty Senate Meeting Minutes documents in the appendix.               <ul style="list-style-type: none"> <li>◆ Combine PSR1 and IP1 into CC7</li> <li>◆ Combine PSR2 and IP2 into CC8</li> </ul> </li> </ul> <p>*Hold convocation sessions in the fall for faculty who teach, or who are interested in, CCS4, CCS5, and PSR3 to strengthen these areas to address our three not met targets. The charge will be to explore why targets were perhaps not met and what actions can be taken</p>

## Three-year Reflection Table – Focus on Improvement

### STUDENT LEARNING GOALS AND OUTCOMES

Last Year's report (2019-2020)	This year's report (2020-2021)	Next year's report (2021-2022)
Specific Recommendations Resulting from Assessment Report in Spring of 2020 for 2019 - 2020	Specific Changes Implemented in 2020-2021 and Detailed Outcomes of Those Changes in Spring of 2021 Assessment Report	Recommendations for Further Improvements in 2021-2022 in Relation to the Item in This Row
Collect longitudinal data to have the ability to well define the population sampled.	Approval requested and approved from Faculty Senate to pilot tracking performance by student for IP2 beginning Fall 21.	Implement a pilot assessment with IP2 in which non-class-specific assessments are recorded in Blackboard (Bb). Data is then extracted from Bb and uploaded to SharePoint for long-term storage each semester. Bb administrators input SLGs and SLOs, input assessments, and pull reports. Assessments need to be provided and SLOs to SLGs need aligned once they appear in Bb (one-time effort). Rename Developmental Content Categories. Combine PSR1 and IP1 into CC7 Combine PSR2 and IP2 into CC8
	<ol style="list-style-type: none"> <li>1. Change: For each rubric, if students received a score in more than one category, their score was averaged. When <math>N &gt; 30</math> and other criteria were met, ANOVA <math>F</math> was reported, else Mann-Whitney <math>U</math> was reported. Outcome:</li> <li>2. Change: Data was disaggregated by Class Level by Year in School. Outcome:</li> <li>3. Change: To prevent an inflated risk of Type I error, a small number of significance tests were conducted. Outcome:</li> <li>4. Change: <math>\eta^2</math> (effect sizes) were reported for practical vs. statistical significance in quantitative analysis. Outcome: While differences between groups may be significant, there may not be a</li> </ol>	This approach to data analysis will be maintained going forward and used by the IR Director so that we ensure consistency.

	practical difference. Reporting effect size helps in the implementation decision-making process.	
	CCS4 Target not met --	Follow up on convocation group's recommendations following faculty discussion of CCS4 and not meeting target
	CCS5 – Target not met	Follow up on convocation group's recommendations following faculty discussion of CCS5 and not meeting target
	PSR3 – target not met	Follow up on convocation group's recommendations following faculty discussion of PSR3 and not meeting target

**Appendices:** a copy or example of each assessment tool used; SPSS analysis, including visual displays

## Assessment Cycle Informative Table – Plan Fall AY2021-2022 (Goals/Outcomes, Methodology, Target)

### ALL STUDENT LEARNING GOALS AND OUTCOMES, METHODS, AND TARGETS

Goals/Outcomes	Methods	Target
<p>Student Learning Goals (Include the outcomes(s) and objectives underneath the respective goal, as applicable.)</p>	<p>Describe the Assessment Methods (Indicate whether instrument is direct or indirect)</p>	<p>Expected Outcomes, i.e., Benchmarks for Success</p>
<p><b>Critical Capacities Skills 1:</b> Problem solving requires students to demonstrate the ability to raise vital questions and problems, formulating them clearly and precisely.</p> <p>SLO 1: Students will demonstrate the ability to state a problem/question.</p> <p>SLO 2: Students will demonstrate the ability to determine solutions associated with the problem/question.</p> <p>SLO 3: Students will demonstrate the ability to evaluate evidence associated with the solutions.</p> <p>SLO 4: Students will demonstrate the ability to select and defend the best solution for the problem/question.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS1 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>
<p><b>Critical Capacities Skills 2:</b> Information literacy requires students to demonstrate the ability to locate, evaluate, select and assess relevant information, use abstract ideas to interpret information effectively, and come to well-reasoned conclusions and solutions.</p> <p>SLO 1: Students will demonstrate the ability to determine the nature and extent of information needed.</p> <p>SLO 2: Students will demonstrate the ability to access needed information effectively and efficiently.</p> <p>SLO 3: Students will demonstrate the capacity to evaluate information and its sources critically.</p> <p>SLO 4: Students will demonstrate individually, or as a member of a group, the ability to use information effectively in order to accomplish a planned objective.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS2 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>

Goals/Outcomes	Methods	Target
SLO 5: Students will demonstrate the ethical and legal use of information.		
<p><b>Critical Capacities Skills 3:</b> Critical reading requires students to demonstrate the ability to think open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences.</p> <p>SLO 1. Students will demonstrate the ability to recognize possible implications of a text beyond the author's overt message.</p> <p>SLO 2. Students will demonstrate the capacity to evaluate a text according to its scholarly contributions and consequences.</p> <p>SLO 3. Students will demonstrate the ability to engage in reading as part of a continuing dialogue within and beyond a discipline or community of readers.</p> <p>SLO 4. Students will demonstrate the capacity to discuss texts, verbally and in written form, with an independent intellectual perspective.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS3 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>
<p><b>Critical Capacities Skills 4:</b> Quantitative literacy requires students to demonstrate the ability to think open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences.</p> <p>SLO1: Students will demonstrate the ability to analyze and interpret quantitative information.</p> <p>SLO2. Students will demonstrate the capacity to critically analyze the limitations and bias of quantitative information.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS4 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>
<p><b>Critical Capacities Skills 5:</b> Oral/written communication requires students to demonstrate the ability to communicate effectively with others when figuring out solutions to complex problems.</p> <p>SLO 1. Students will demonstrate competent content development and organization.</p> <p>SLO 2. Students will demonstrate the appropriate use of sources and evidence.</p> <p>SLO3. Students will demonstrate the use of syntax,</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS5 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>

Goals/Outcomes	Methods	Target
grammar, and delivery appropriate for discipline and audience.		
<p><b>Critical Capacities Skills 6:</b> Collaboration requires students to demonstrate the ability to communicate effectively with others when figuring out solutions to complex problems.</p> <p>SLO 1. Students will demonstrate the ability to compromise and handle alternative viewpoints.</p> <p>SLO 2. Students will demonstrate the ability to build consensus among group members.</p> <p>SLO 3. Students will demonstrate the ability to identify group member strengths and utilize them appropriately.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> CCS6 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>
<p><b>Personal and Social Responsibility 1:</b> Relationships and value systems requires students recognize their relationships to communities and evaluate different value systems associated with community issues.</p> <p>A. Relationships</p> <p>SLO 1. Students will demonstrate the ability to recognize their relationships to communities.</p> <p>B. Value Systems</p> <p>SLO 2. Students will demonstrate the ability to evaluate different value systems associated with community issues.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> PSR1 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>
<p><b>Personal and Social Responsibility 2:</b> Responding to community needs requires students respond to community needs by engaging in meaningful community activities.</p> <p>SLO 1. Students will demonstrate engagement in meaningful community activities.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> PSR2 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>
<p><b>Personal and Social Responsibility 3:</b> Individual well-being requires students exercise individual well-being by exploring and practicing healthy behaviors.</p> <p>SLO 1. Students will demonstrate the exploration and practice of healthy behaviors.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> PSR3 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>
<p><b>Interconnecting Perspectives 1:</b> Interconnecting perspectives: knowledge requires students demonstrate through coursework an understanding of</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> IP1 Rubric, Direct</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math>.</p>

Goals/Outcomes	Methods	Target
<p>diversity both globally and within the United States. The work product must serve to assess student knowledge of classifications of diverse groups and populations. In addition, the product must serve to assess the student's knowledge of the characteristics of at least one diverse population or group within the global community.</p> <p>SLO 1. Students will demonstrate knowledge of cultural self-awareness.</p> <p>SLO 2. Students will demonstrate knowledge of cultural worldview frameworks.</p> <p>SLO 3. Students will demonstrate curiosity about other cultures.</p>	<p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	
<p><b>Interconnecting Perspectives 2:</b> Interconnecting perspectives: experience requires students demonstrate through an applied experience an understanding of diversity both globally and within the United States. The work product must serve to assess students' understanding of diversity related to complex social issues, decisions and consequences. They should be able to draw upon and consider an increasingly diverse set of scientific, historical, cultural, and social perspectives to frame their arguments and should employ multiple ways of thinking about problems to both evaluate and respond to alternative viewpoints</p> <p>SLO 1. Students will demonstrate knowledge of cultural self-awareness.</p> <p>SLO 2. Students will demonstrate empathy and will recognize intellectual and emotional dimensions of more than one worldview.</p> <p>SLO 3. Students will demonstrate openness in their interactions with other cultures.</p>	<p><b>Activity:</b> Varies depending on specific class in the GE category.</p> <p><b>Instrument:</b> IP2 Rubric, Direct</p> <p><b>Time Frame:</b> Each Semester: classes vary by rotation</p> <p><b>Personnel Involved:</b> Faculty; General Education Committee</p>	<p>There will be a significant difference between freshmen and seniors with <math>\alpha = .05</math> in the growth model.</p> <p>In the pilot proficiency model, 75% will be at either a 3 or a 4 for the average rating of the categories.</p>



# Appendices

## General Education Assessment Report Spring 2019 Fall 2019 Spring 2020

PSR1

PSR2

PSR3

IP1

IP2

CCS1

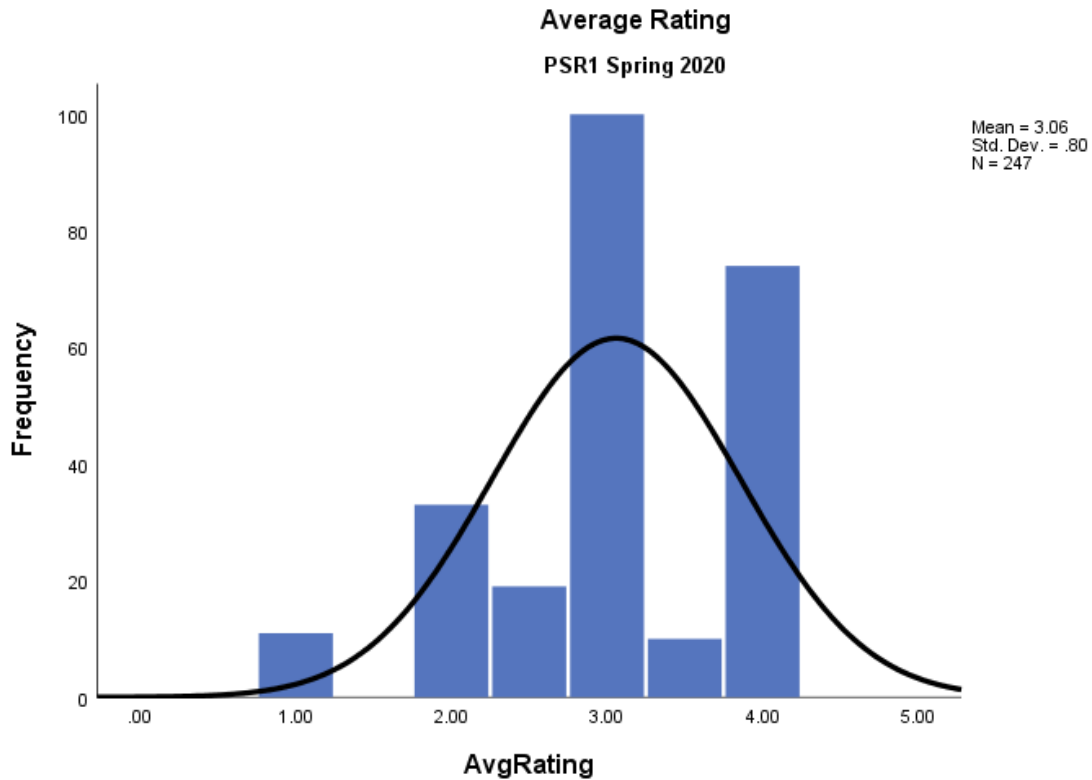
CCS2

CCS3

CCS4

CCS5

CCS6



**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
							Statistic	Std. Error	Statistic	Std. Error
AvgRating	247	1.00	4.00	3.0587	.79990	.640	-.608	.155	.009	.309
Valid N (listwise)	247									

$$z = \frac{skewness}{SE_{skewness}} = \frac{-.608}{.155} = -3.92$$

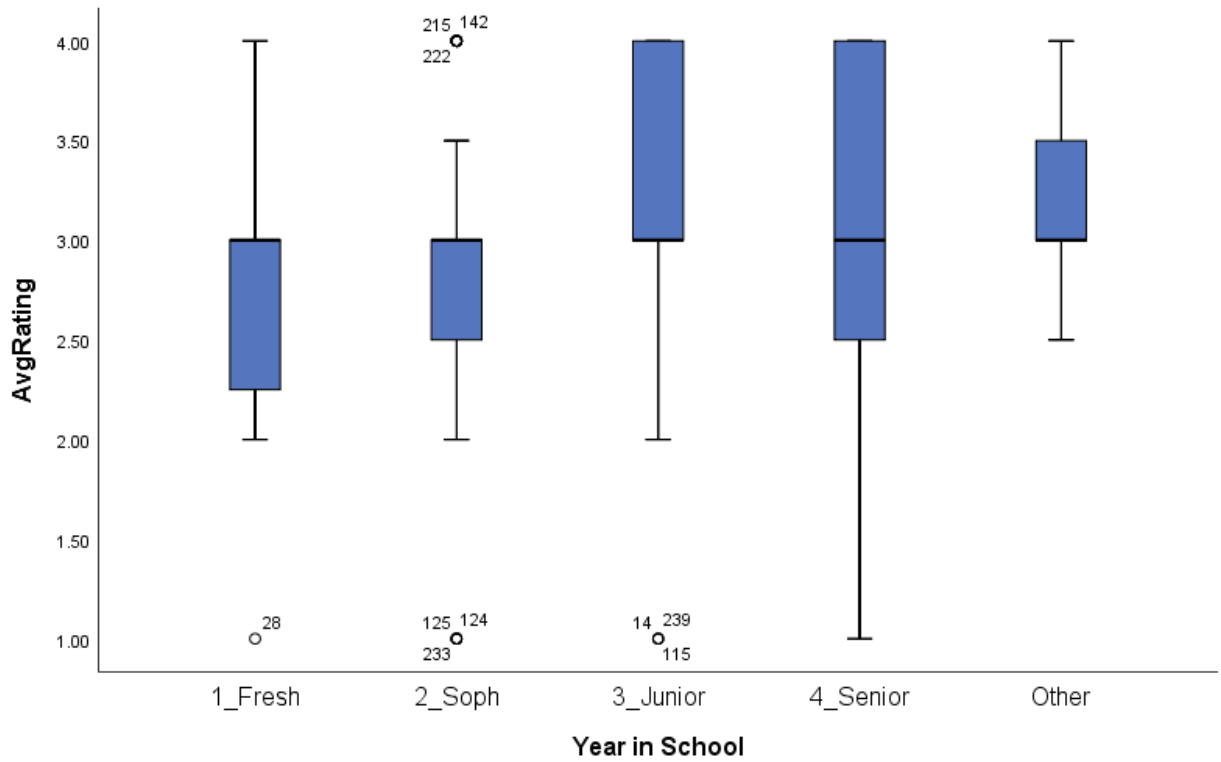
Skewness is significant at  $\alpha = .05$

$$z = \frac{Excess\ kurtosis}{SE_{kurtosis}} = \frac{.009}{.309} = .029$$

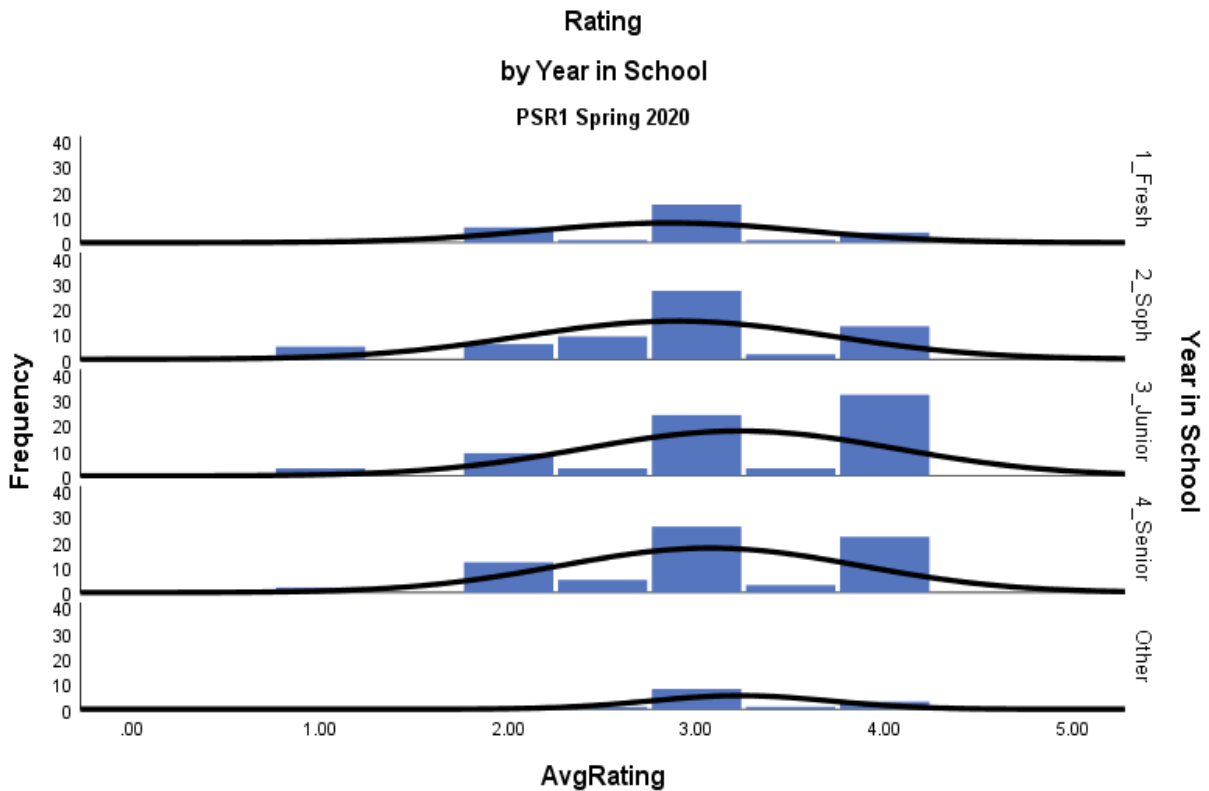
Kurtosis is insignificant at  $\alpha = .05$

Distribution is nonnormal: No floor or ceiling effect. No outliers.

(Warner, 2013, p. 153)



Boxplots revealed outliers for classes: However, outliers are not extreme because they are within the range of possible scores. Outliers were not removed.



Histograms reveal 2\_Soph group has the most normal distribution, with the 3\_Junior group approaching an exponential distribution. For 1\_Fresh group, the sampling distribution is  $n < 30$ . For each remaining class, the sampling distribution is  $n > 30$ . Nonparametric test chosen.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
AvgRating	247	3.0587	.79990	1.00	4.00
School Year	234	2.7949	1.00247	1.00	4.00

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1.00	28	44.07	1234.00
	4.00	70	51.67	3617.00
	Total	98		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	828.000
Wilcoxon W	1234.000
Z	-1.259
Asymp. Sig. (2-tailed)	.208

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 4\_Senior group distributions at  $p < .05$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1.00	28	40.84	1143.50
	3.00	74	55.53	4109.50
	Total	102		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	737.500
Wilcoxon W	1143.500
Z	-2.364
Asymp. Sig. (2-tailed)	.018

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 3\_Junior group distributions: AvgRating scores of Juniors ( $Mdn = 3.00$ ) were higher than AvgRating scores of Freshman ( $Mdn = 3.00$ )  
 $U(N_3 = 74, N_1 = 28) = 737.500, p = \frac{.018}{2} < .05$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1.00	28	44.45	1244.50
	2.00	62	45.98	2850.50
	Total	90		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	838.500
Wilcoxon W	1244.500
Z	-.273
Asymp. Sig. (2-tailed)	.785

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 2\_Soph group distributions at  $p < .05$

The ANOVA omnibus test missed detecting significant findings due to the sensitivity of the mean. However, the planned contrasts confirmed the findings:

### Descriptives

AvgRating	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	28	2.8571	.71824	.13574	2.5786	3.1356	1.00	4.00
2.00	62	2.8952	.82052	.10421	2.6868	3.1035	1.00	4.00
3.00	74	3.2297	.83251	.09678	3.0369	3.4226	1.00	4.00
4.00	70	3.0714	.79530	.09506	2.8818	3.2611	1.00	4.00
Total	234	3.0491	.81347	.05318	2.9444	3.1539	1.00	4.00

### Test of Homogeneity of Variances

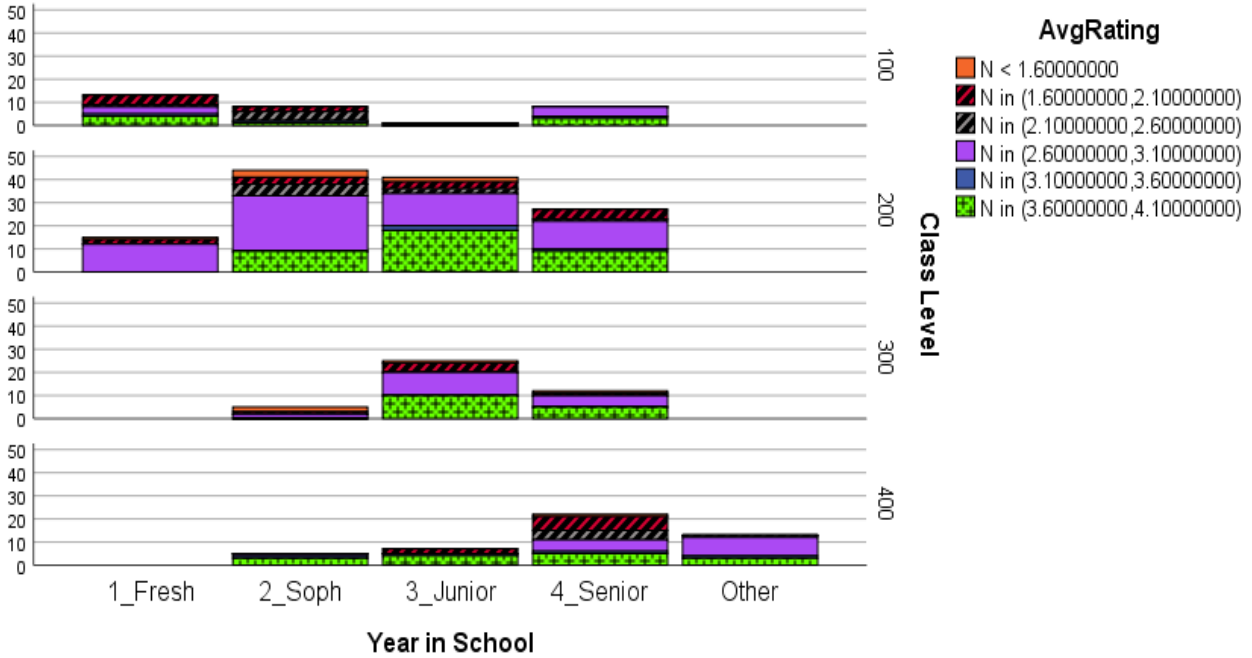
		Levene Statistic	df1	df2	Sig.
AvgRating	Based on Mean	.842	3	230	.472
	Based on Median	1.145	3	230	.332
	Based on Median and with adjusted df	1.145	3	226.207	.332
	Based on trimmed mean	1.060	3	230	.367

No significant variance at  $p < .05$

### ANOVA

**Average Rating Frequency Count  
by Class Level by Year in School**

PSR1 Spring 2020 Cycle



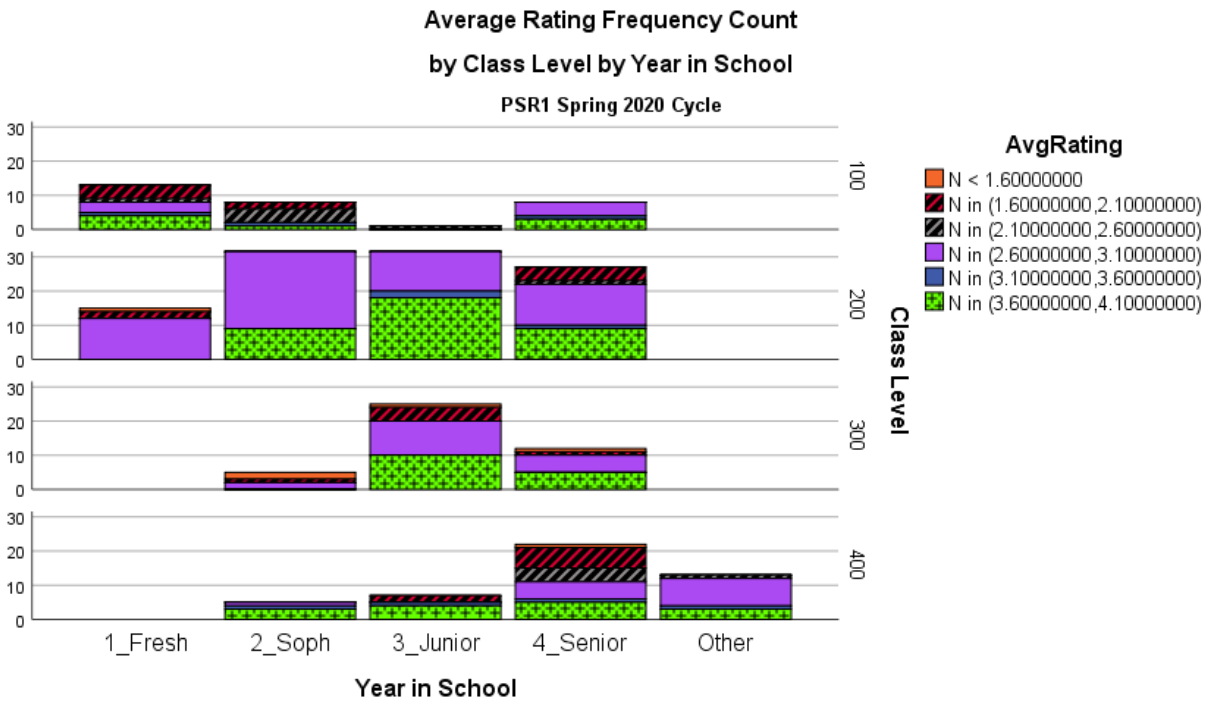
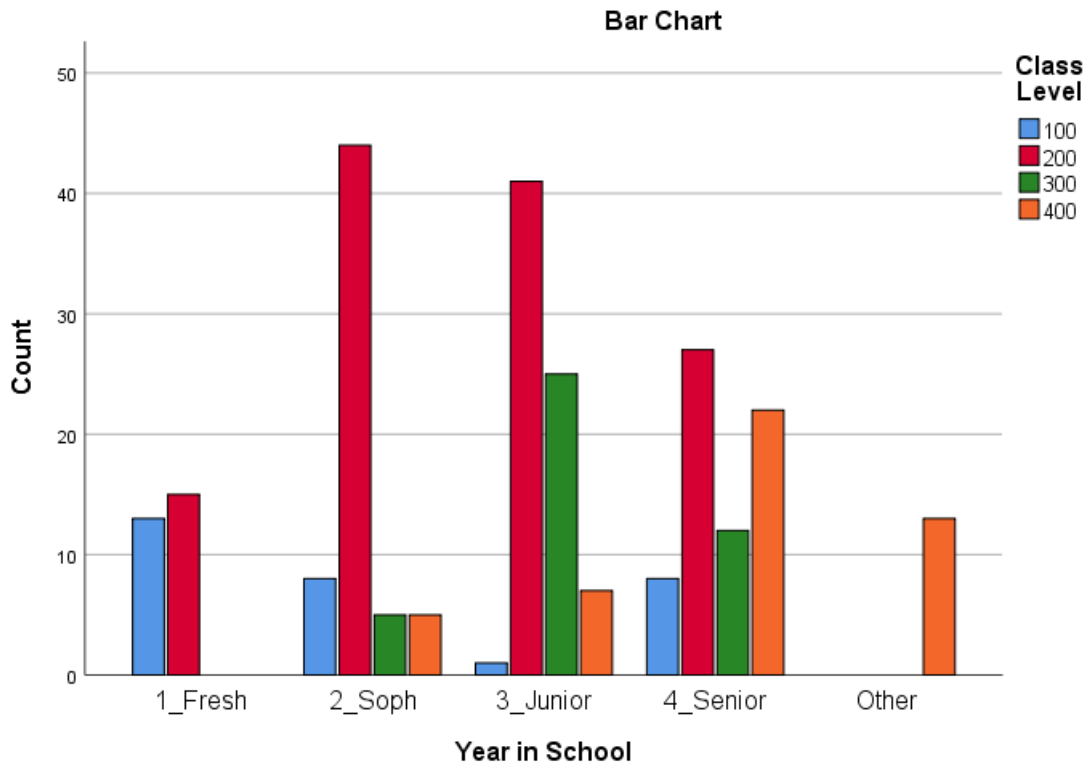
		Contrast	Contrast	Std. Error	t	df	Sig. (2-tailed)
AvgRating	Assume equal variances	1	.2143	.18012	1.190	230	.235
		2	.3726	.17872	2.085	230	.038
		3	.0380	.18341	.207	230	.836
	Does not assume equal variances	1	.2143	.16571	1.293	54.818	.201
		2	.3726	.16670	2.235	56.069	.029
		3	.0380	.17112	.222	59.117	.825

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	1	1 CAS
200	1:1	70.9%; 29.1% CAS, Ed&Health
300	1:1:1	50%; 47.6%; 2.4% COB; CAS; Ed&Health
400	2:1	95.7%; 4.3% Ed&Health; Special Programs

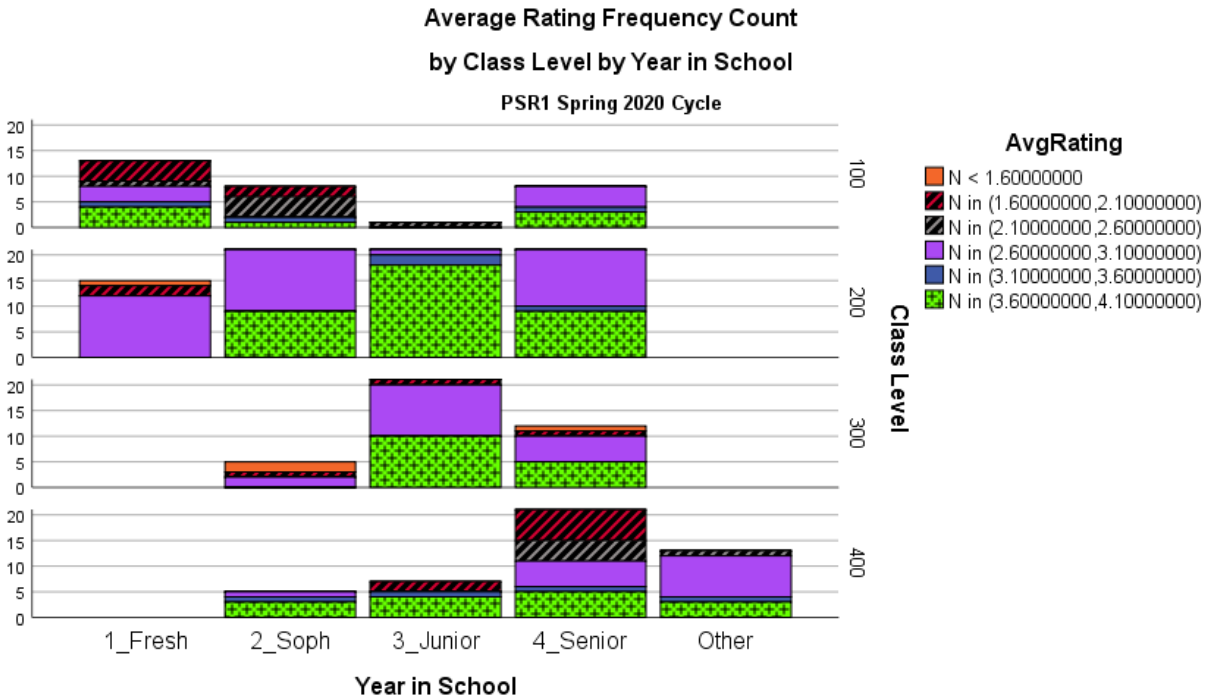
### Year in School \* Class Level Crosstabulation

Count

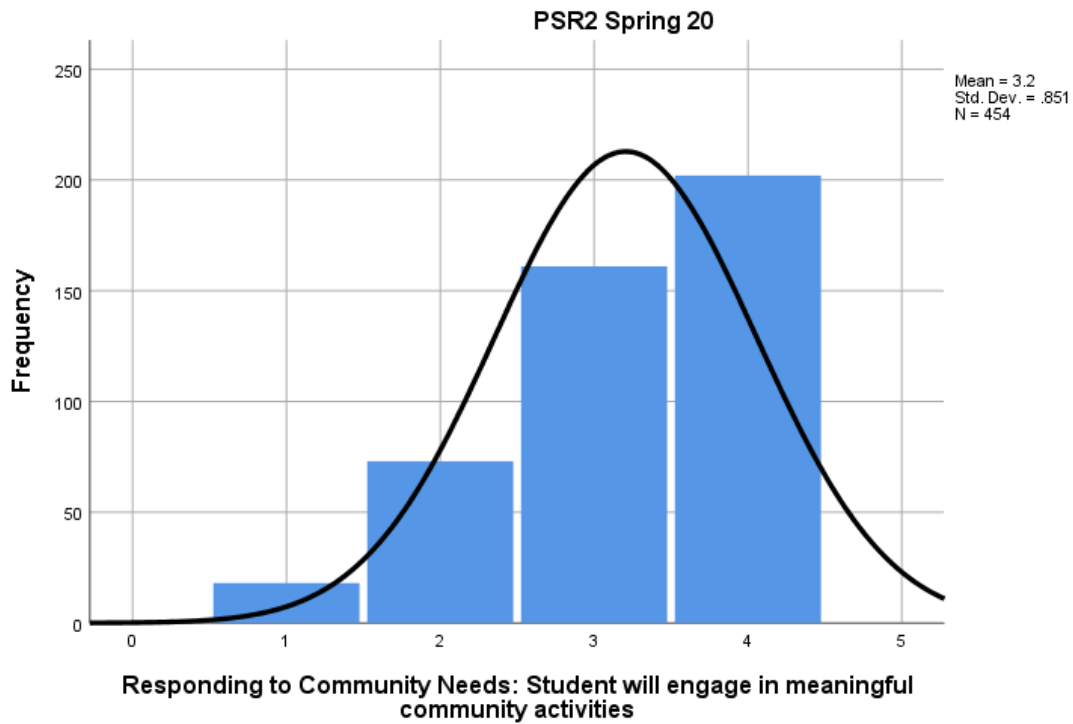
		Class Level				Total
		100	200	300	400	
Year in School	1_Fresh	13	15	0	0	28
	2_Soph	8	44	5	5	62
	3_Junior	1	41	25	7	74
	4_Senior	8	27	12	22	69
	Other	0	0	0	13	13
Total		30	127	42	47	246







In this sample, most students earn this general education credit from 200-level courses, at 52%. In this sample, 54% of Freshmen earn this credit from 200-level classes, 71% of Sophomores earn this credit from 200-level classes, 55% of Juniors earn this credit from 200-level classes, and 39% of Seniors earn this credit from 200-level classes.



**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic		
	c	c	c	c	Statistic	c	c	Statistic		
							Std. Error	Std. Error		
Responding to Community Needs: Student will engage in meaningful community activities	454	1	4	3.20	.851	.724	-.793	.115	-.202	.229
Valid N (listwise)	454									

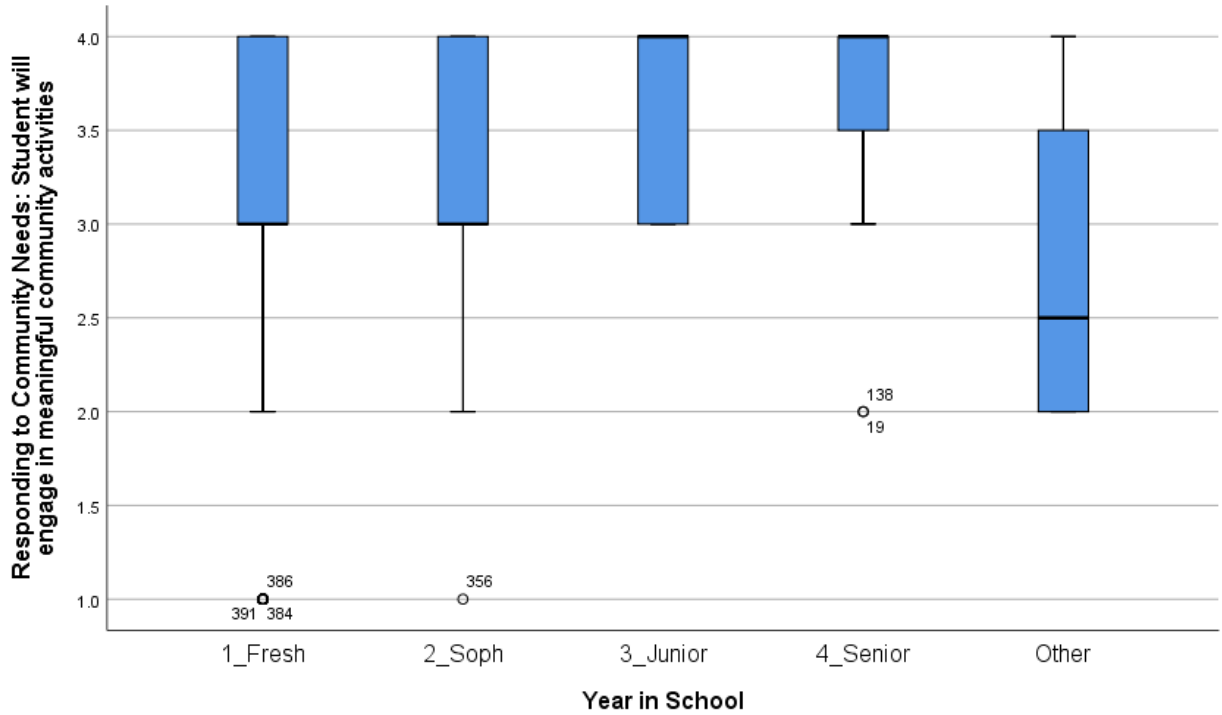
$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-.793}{.115} = -6.90$$

Skewness is significant at  $\alpha = .05$

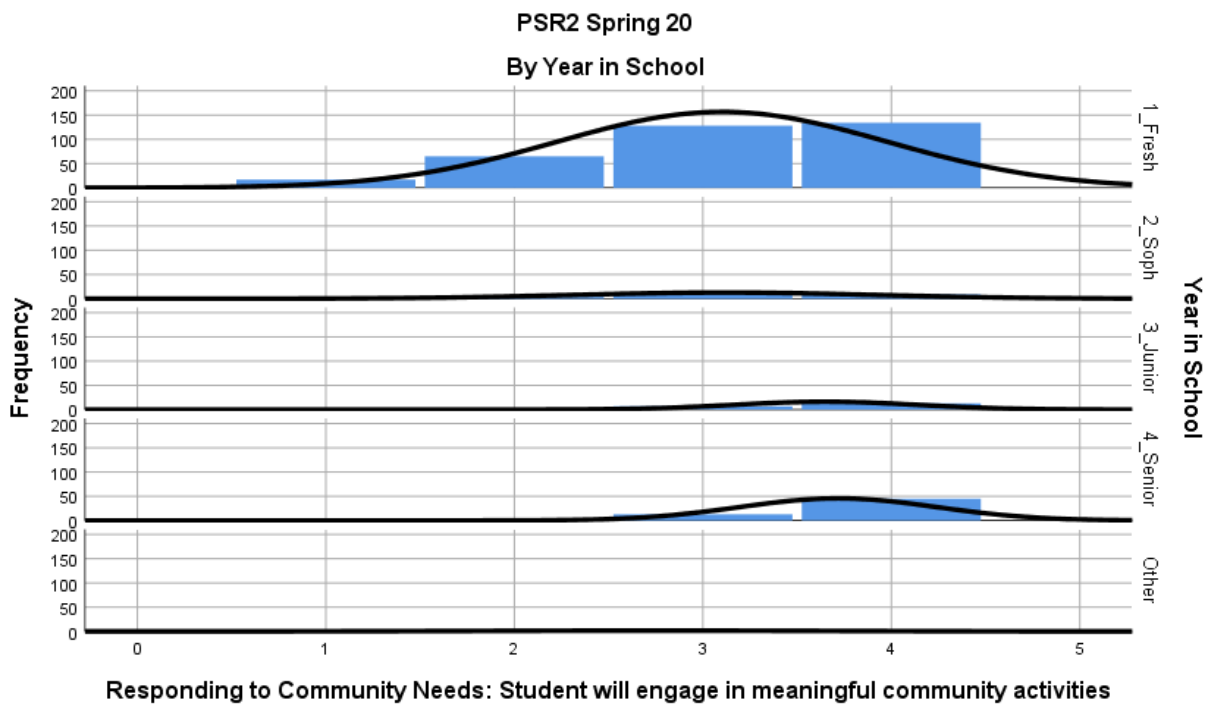
$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{-.202}{.229} = -.882$$

Kurtosis is insignificant at  $\alpha = .05$

Distribution is dramatically different from normal: distribution is exponential or j-shaped. No outliers. Central Limit Theorem is not applicable because average scores are not calculated: There is only one rubric category.



Boxplots revealed outliers for classes: However, outliers are not extreme because they are within the range of possible scores. Outliers were not removed.



Histograms reveal nonnormal distributions, with 2\_Soph and 3\_Junior sampling distributions having  $n < 30$ . Nonparametric test chosen.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Responding to Community Needs: Student will engage in meaningful community activities	454	3.20	.851	1	4
School Year	450	1.55	1.067	1	4

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
Responding to Community Needs: Student will engage in meaningful community activities	1	344	190.46	65518.00
	4	60	271.53	16292.00
	Total	404		

### Test Statistics<sup>a</sup>

	Responding to Community Needs: Student will engage in meaningful community activities
Mann-Whitney U	6178.000
Wilcoxon W	65518.000
Z	-5.333
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 4\_Senior group distributions: Responding to Community Needs scores of Seniors ( $Mdn = 4.00$ ) were higher than Responding to Community Needs scores of Freshman ( $Mdn = 3.00$ )

$U(N_4 = 60, N_1 = 344) = 6178.000, p < .001$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
Responding to Community	1	344	179.06	61597.00
Needs: Student will engage	3	20	241.65	4833.00
in meaningful community activities	Total	364		

### Test Statistics<sup>a</sup>

Responding to  
Community  
Needs: Student  
will engage in  
meaningful  
community  
activities

Mann-Whitney U	2257.000
Wilcoxon W	61597.000
Z	-2.761
Asymp. Sig. (2-tailed)	.006

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 3\_Junior group distributions: Responding to Community Needs scores of Juniors ( $Mdn = 4.00$ ) were higher than Responding to Community Needs scores of Freshman ( $Mdn = 3.00$ )

$$U(N_3 = 20, N_1 = 344) = 2257.000, p = \frac{.006}{2} < .05$$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
Responding to Community	1	344	185.56	63832.50
Needs: Student will engage	2	26	184.71	4802.50
in meaningful community activities	Total	370		

### Test Statistics<sup>a</sup>

Responding to  
Community  
Needs: Student  
will engage in  
meaningful  
community  
activities

Mann-Whitney U	4451.500
Wilcoxon W	4802.500
Z	-.042
Asymp. Sig. (2-tailed)	.967

a. Grouping Variable: School Year

Insignificant difference between 1\_Fresh and 2\_Soph group distributions: Responding to Community Needs scores of Sophomores (*Mdn* = 3.00) were the same as Responding to Community Needs scores of Freshman (*Mdn* = 3.00)

$$U(N_2 = 26, N_1 = 344) = 4451.500, p = \frac{.967}{2} > .05$$

The ANOVA confirmed the findings and further showed significant differences between groups:

### Descriptives

Responding to Community Needs: Student will engage in meaningful community activities

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	344	3.10	.876	.047	3.01	3.19	1	4
2	26	3.12	.816	.160	2.79	3.45	1	4
3	20	3.65	.489	.109	3.42	3.88	3	4
4	60	3.72	.524	.068	3.58	3.85	2	4
Total	450	3.21	.850	.040	3.13	3.29	1	4

### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Responding to Community Needs: Student will engage in meaningful community activities	Based on Mean	6.471	3	446	.000
	Based on Median	10.030	3	446	.000
	Based on Median and with adjusted df	10.030	3	443.849	.000
	Based on trimmed mean	8.839	3	446	.000

Significant variance at  $p < .05$

### ANOVA

Responding to Community Needs: Student will engage in meaningful community activities

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	23.538	3	7.846	11.633	.000
Within Groups	300.826	446	.674		
Total	324.364	449			

At least one significant difference in group means at  $p < .001$

$$F(3, 446) = 11.633, p < .001$$

$$\eta^2 = \frac{SS_{between}}{SS_{total}} = \frac{23.538}{300.826} = .08$$

About 8% of the variance in average rating is predicted from school year.

### Contrast Coefficients

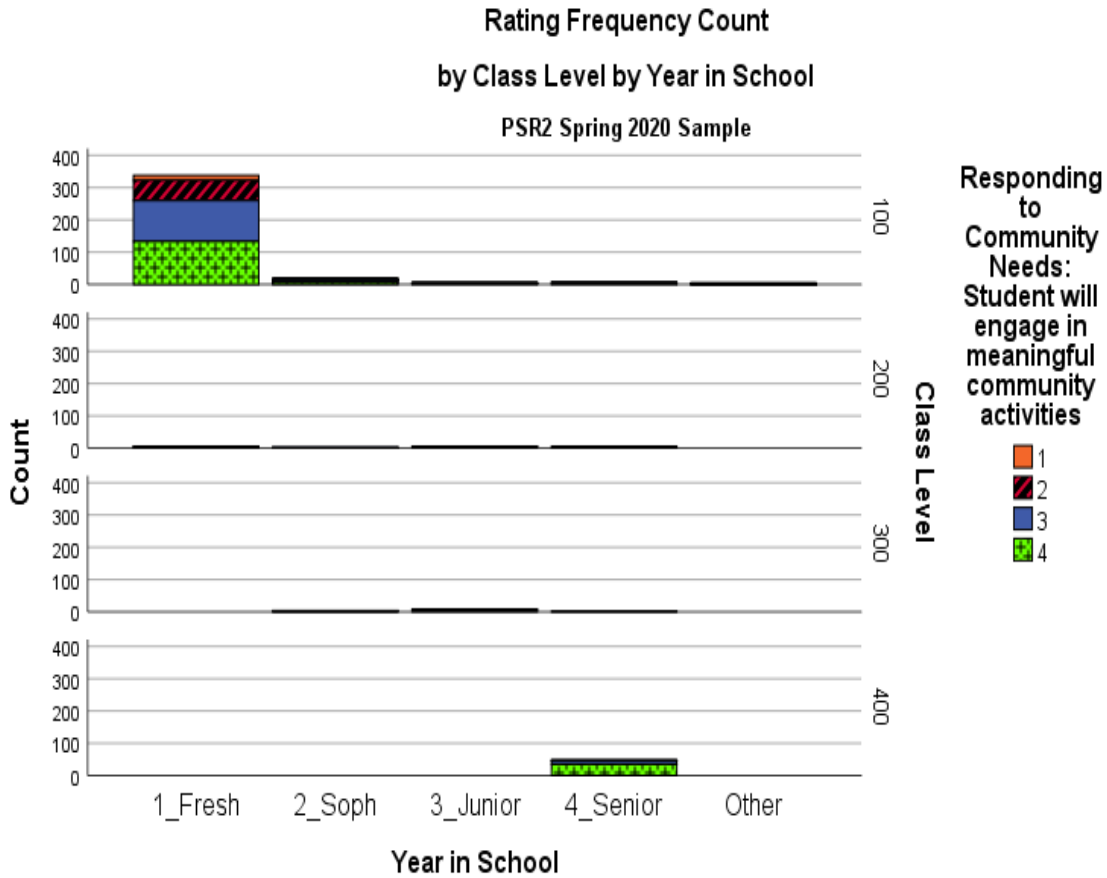
Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

### Contrast Tests

		Contrast	Value of	Std.	t	df	Sig. (2-tailed)
		t	Contrast	Error			
Responding to Community Needs: Student will engage in meaningful community activities	Assume equal variances	1	.61	.115	5.352	446	.000
		2	.55	.189	2.902	446	.004
		3	.01	.167	.082	446	.935
	Does not assume equal variances	1	.61	.082	7.455	125.551	.000
		2	.55	.119	4.600	26.695	.000
		3	.01	.167	.082	29.531	.935

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	2:1:1	1.3%; 24.2%; 74.5% CAS; Ed&Health; UNIV
200	1	1 CAS
300	1:1	40%; 60% COB; Special Programs
400	3	1 Ed&Health

\*95 courses coded as 100-level



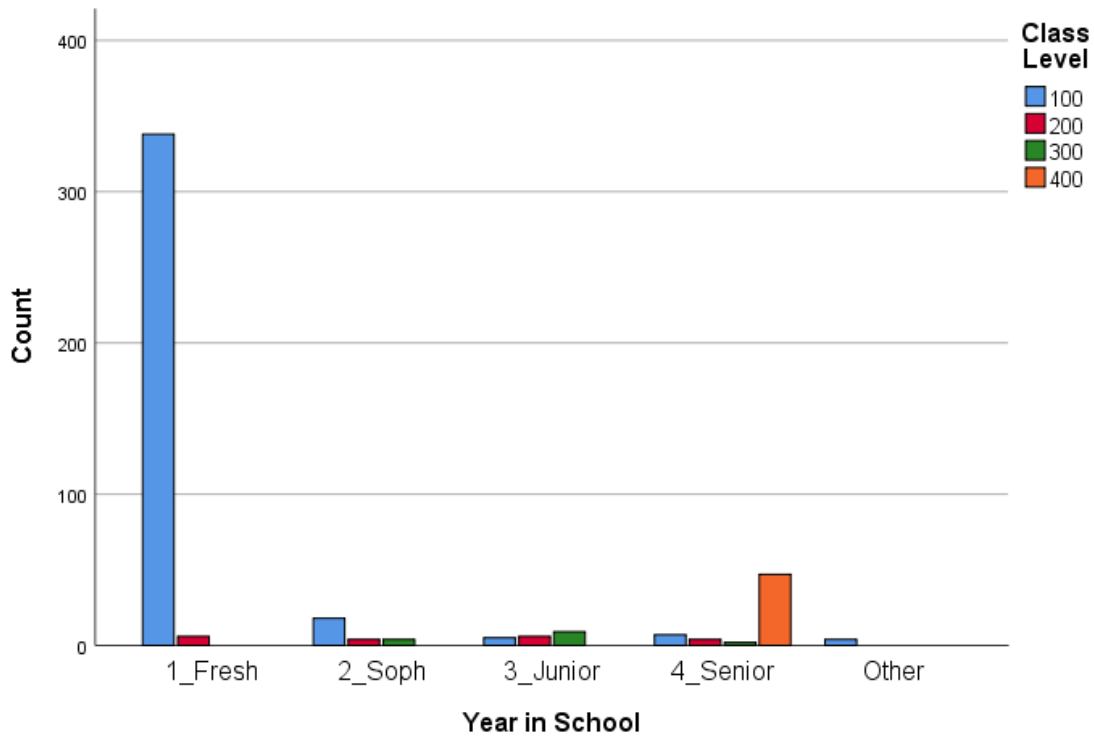


### Year in School \* Class Level Crosstabulation

Count

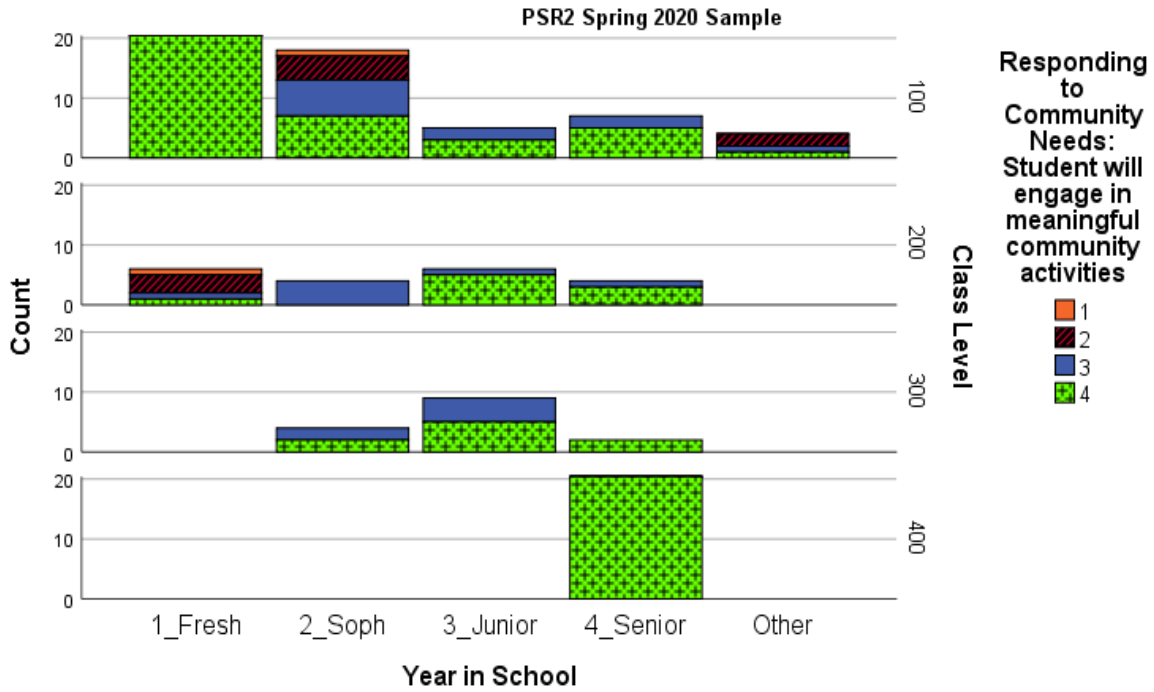
		Class Level				Total
		100	200	300	400	
Year in School	1_Fresh	338	6	0	0	344
	2_Soph	18	4	4	0	26
	3_Junior	5	6	9	0	20
	4_Senior	7	4	2	47	60
	Other	4	0	0	0	4
Total		372	20	15	47	454

Bar Chart

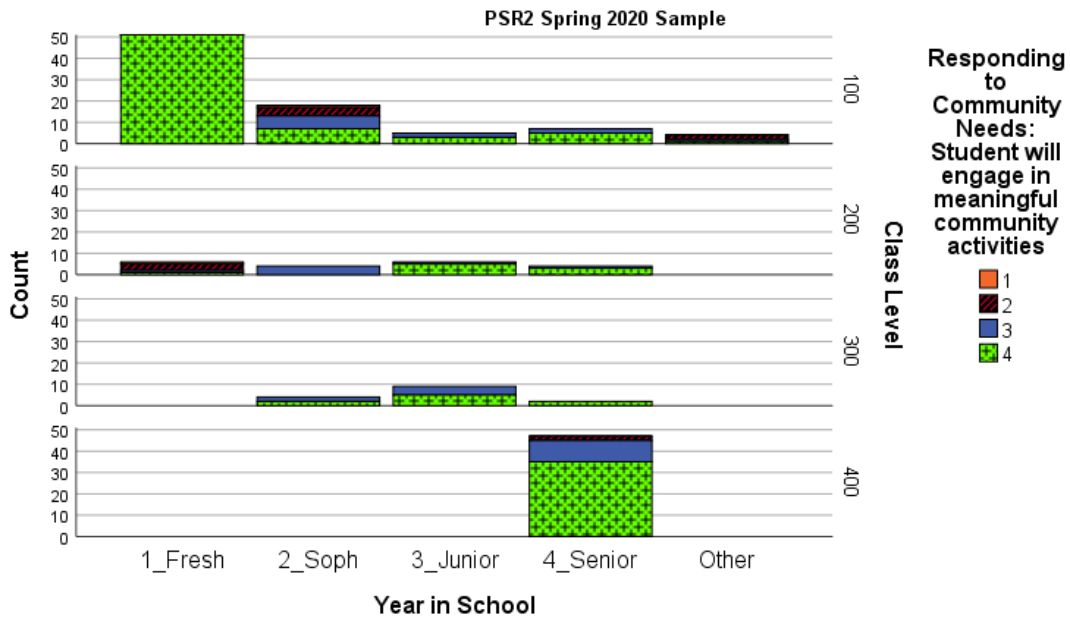


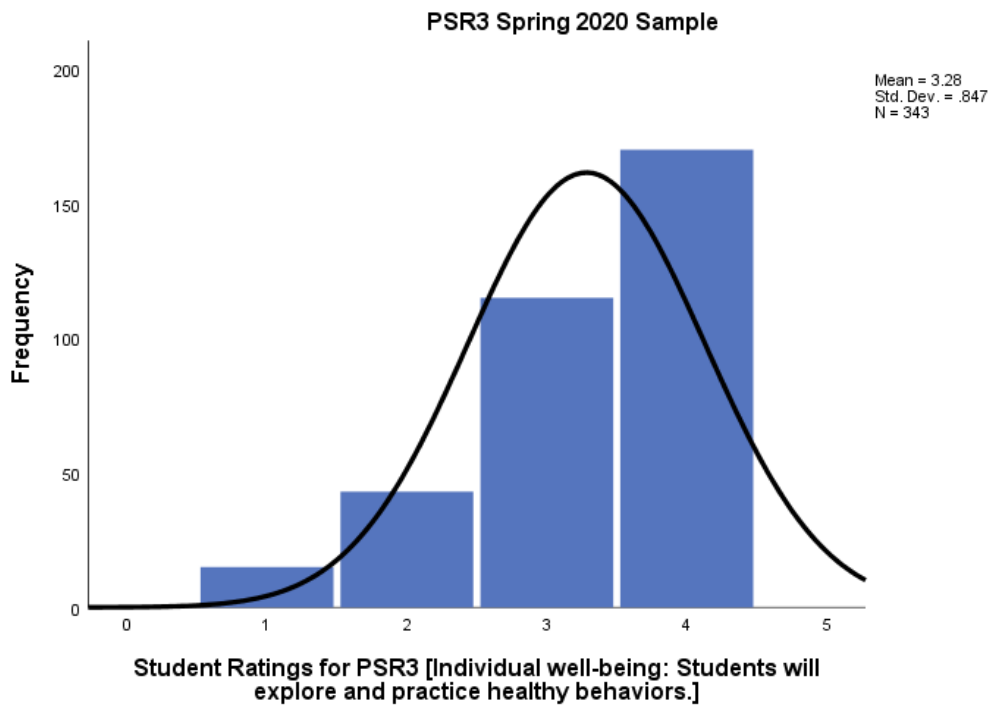
In this sample, most students earn this general education credit from 100-level classes, at 82%. In this sample, 98% of Freshmen earn this credit and 69% of Sophomores earn this credit from 100-level classes. Juniors and Seniors earn this credit in 300- and 400-level classes at 45% and 78% respectively. Juniors and Seniors have higher scores across classes than Freshman. However, there is no interclass-level comparison at 300- and 400-levels. Possible suggestion to revise when students are tested: timing of test could depend on degree program.

Rating Frequency Count - Zoomed In  
by Class Level by Year in School



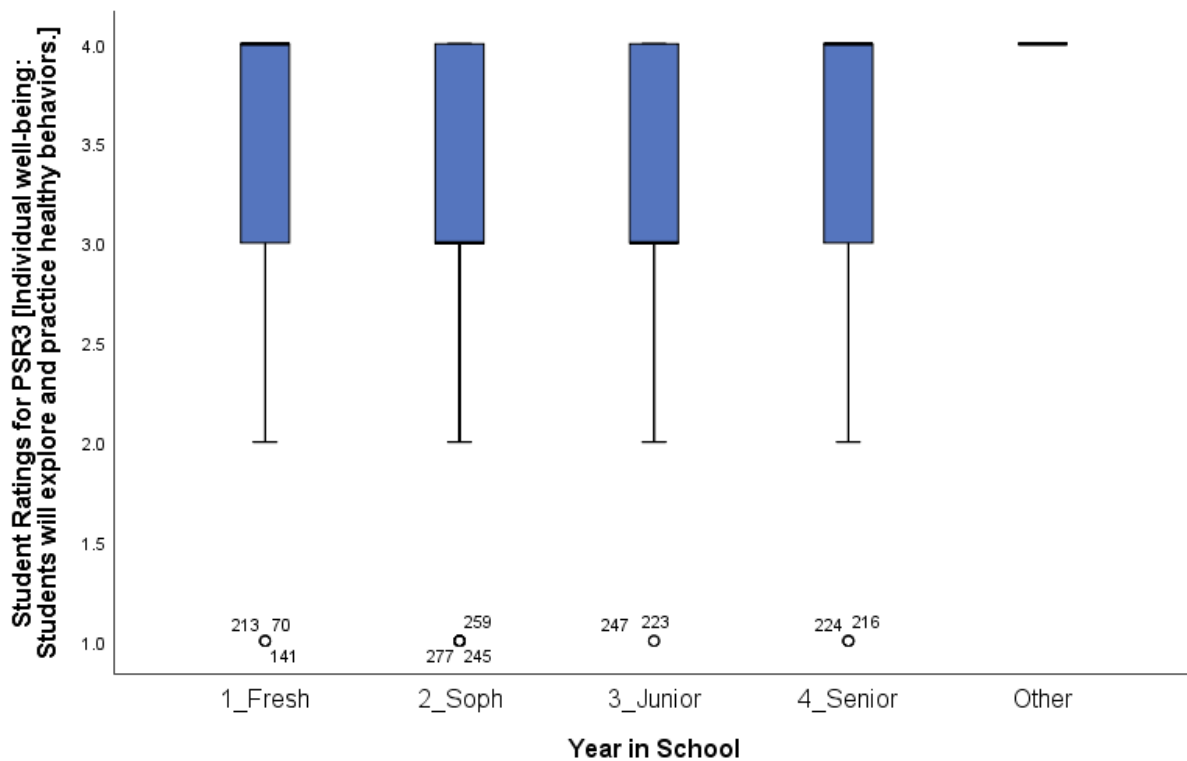
Rating Frequency Count - Zoomed In  
by Class Level by Year in School

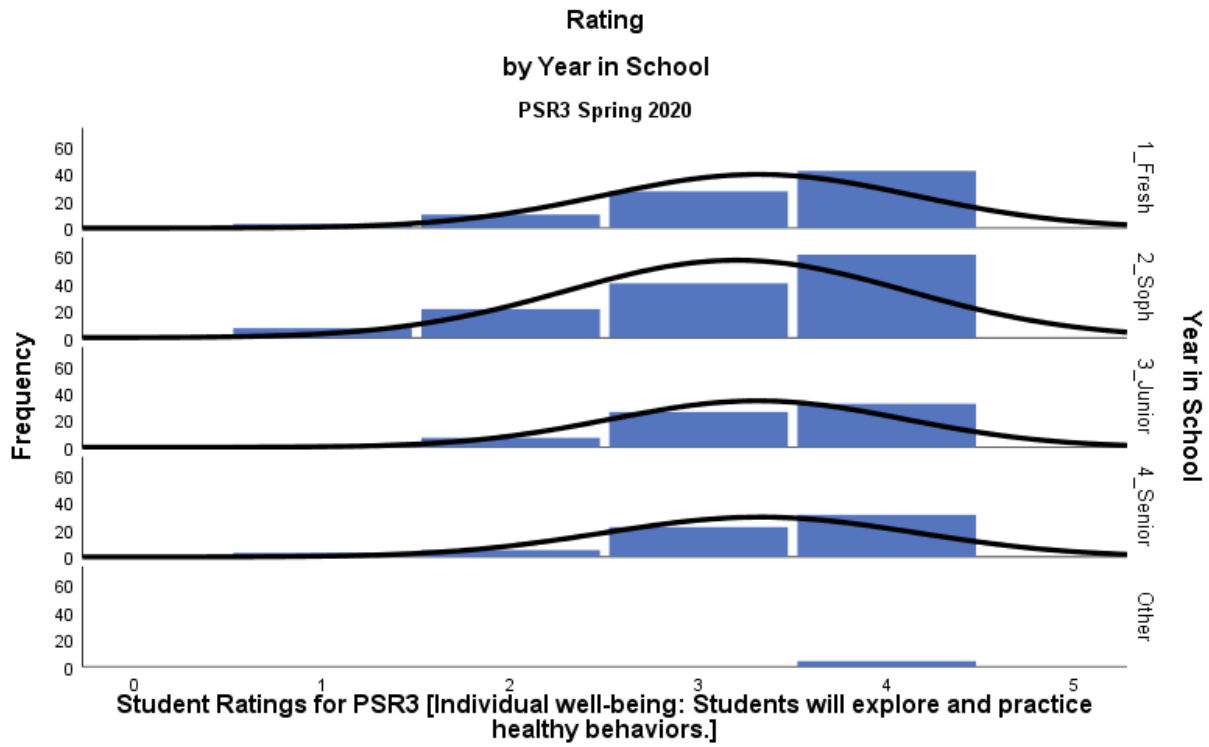




Distribution is not nonnormal: j-shaped. No floor or ceiling effect. No outliers.

◆ PSR3 has one (1) category. ANOVA is robust to non-normal distributions of data. Alternatively, nonparametric analysis is an option.





Outliers exist: However, they are *not* extreme and will remain. Distributions are fairly exponential. Nonparametric test chosen.

**Descriptive Statistics**

	N	Mean	Std. Deviation	Minimum	Maximum
Student Ratings for PSR3 [Individual well-being: Students will explore and practice healthy behaviors.]	343	3.28	.847	1	4
School Year	339	2.32	1.031	1	4

**Ranks**

	School Year	N	Mean Rank	Sum of Ranks
Student Ratings for PSR3	1	82	71.79	5886.50
[Individual well-being: Students will explore and practice healthy behaviors.]	4	61	72.29	4409.50
	Total	143		

**Test Statistics<sup>a</sup>**

Student Ratings for  
PSR3 [Individual well-  
being: Students will  
explore and practice  
healthy behaviors.]

Mann-Whitney U	2483.500
Wilcoxon W	5886.500
Z	-.079
Asymp. Sig. (2-tailed)	.937

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 4\_Senior group distributions at  $p < .05$

**Ranks**

	School Year	N	Mean Rank	Sum of Ranks
Student Ratings for PSR3	1	82	75.57	6197.00
[Individual well-being:	3	67	74.30	4978.00
Students will explore and practice healthy behaviors.]	Total	149		

**Test Statistics<sup>a</sup>**

Student Ratings for PSR3  
[Individual well-being:  
Students will explore and  
practice healthy  
behaviors.]

Mann-Whitney U	2700.000
Wilcoxon W	4978.000
Z	-.197
Asymp. Sig. (2-tailed)	.844

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 3\_Junior group distributions at  $p < .05$

**Ranks**

	School Year	N	Mean Rank	Sum of Ranks
Student Ratings for PSR3	1	82	110.02	9021.50
[Individual well-being:	2	129	103.45	13344.50
Students will explore and practice healthy behaviors.]	Total	211		

**Test Statistics<sup>a</sup>**

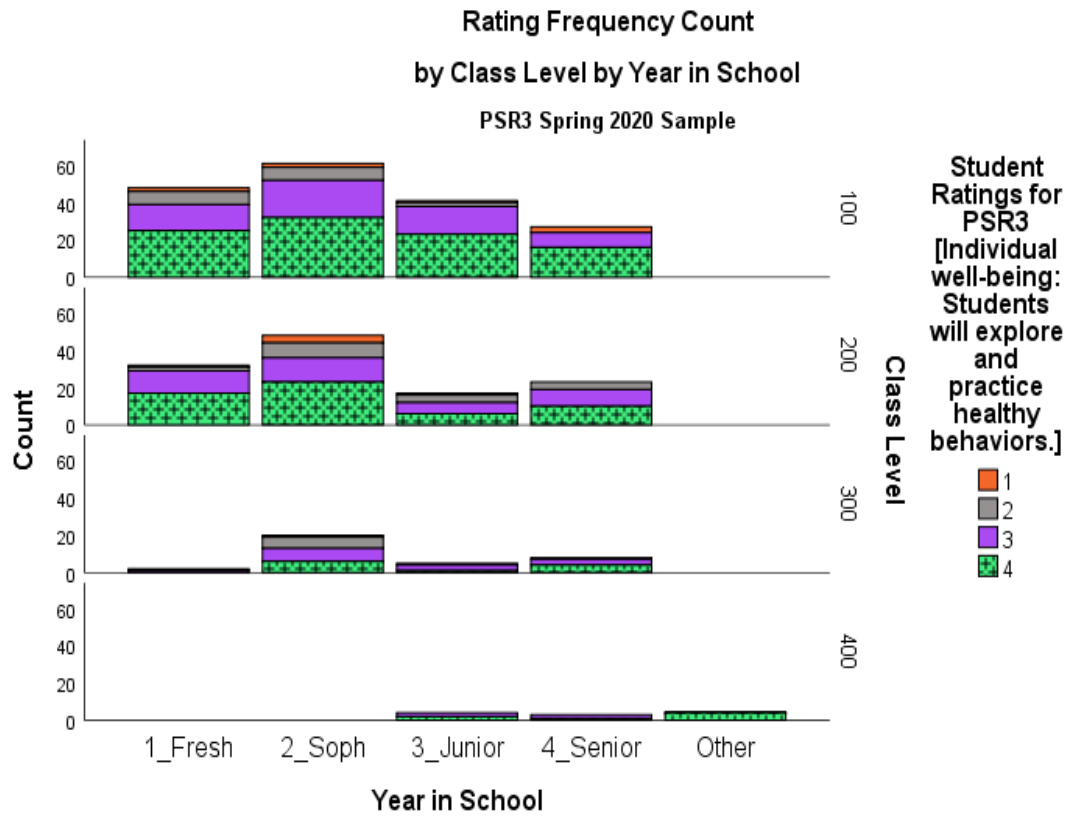
Student Ratings for PSR3  
 [Individual well-being:  
 Students will explore and practice healthy behaviors.]

Mann-Whitney U	4959.500
Wilcoxon W	13344.500
Z	-.828
Asymp. Sig. (2-tailed)	.408

a. Grouping Variable: School Year

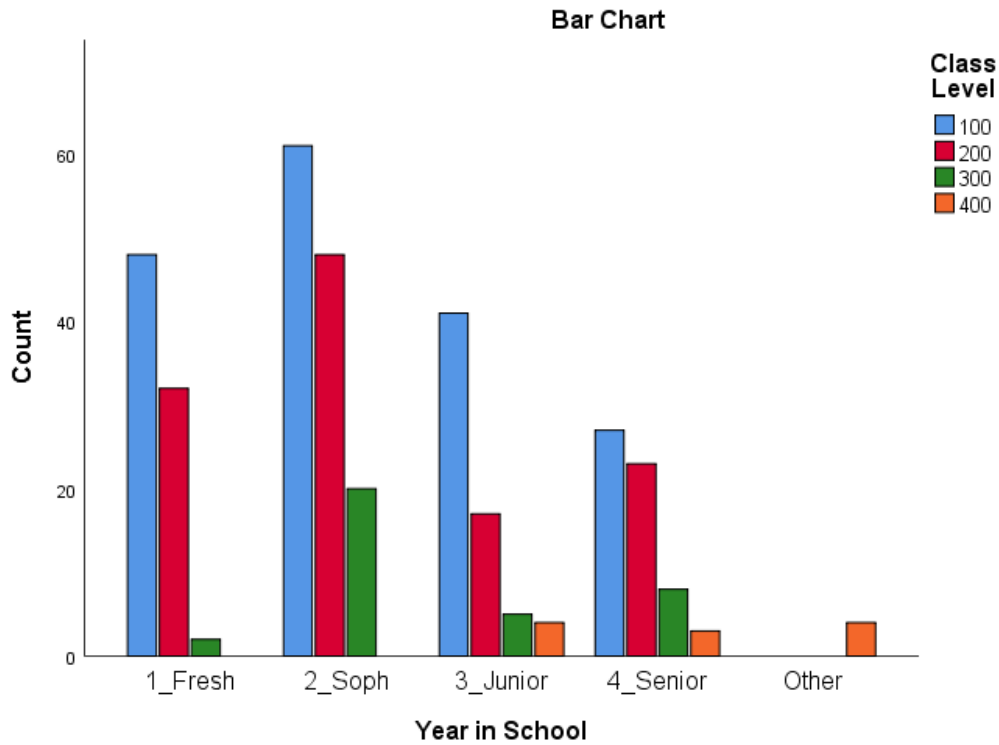
No significant difference between 1\_Fresh and 2\_Soph group distributions at  $p < .05$

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	8 = 4:4	1st = 33.9%, 2nd = 66.2% (CAS, Ed&Health)
200	4 = 1:3	1st = 5.8%, 2nd = 94.2% (CAS, Ed&Health)
300	1	1 COB
400	1	1 Ed&Health



**Year in School \* Class Level Crosstabulation**

Year in School		Class Level				Total
		100	200	300	400	
1_Fresh		48	32	2	0	82
2_Soph		61	48	20	0	129
3_Junior		41	17	5	4	67
4_Senior		27	23	8	3	61
Other		0	0	0	4	4
Total		177	120	35	11	343



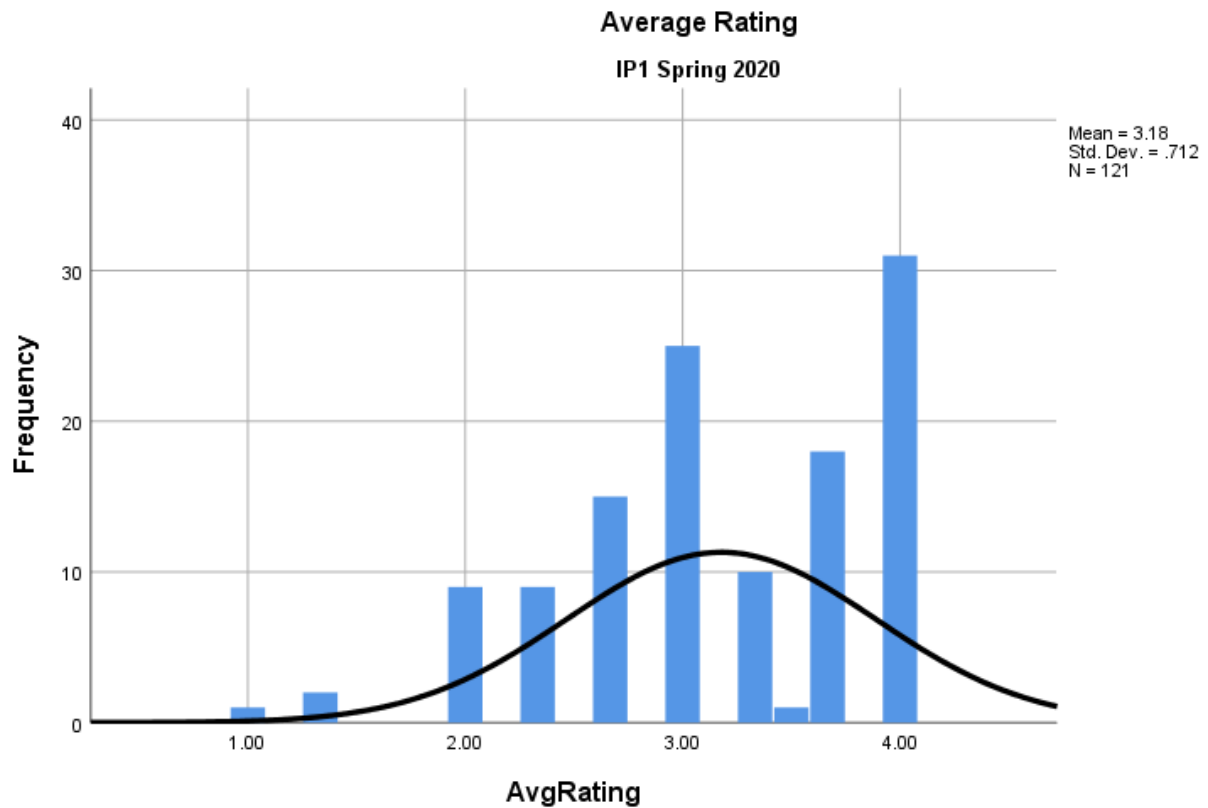
86.6% of students completed PSR3 in 100- and 200-level courses.

At the 100 level, 8 unique courses were sampled.

At the 200 level, 4 unique courses were sampled.

At the 400 level, we only have 1 class ( $n = 11$ ).





**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
							Statistic	Std. Error	Statistic	Std. Error
AvgRating	121	1.00	4.00	3.1777	.71159	.506	-.605	.220	-.214	.437
Valid N (listwise)	121									

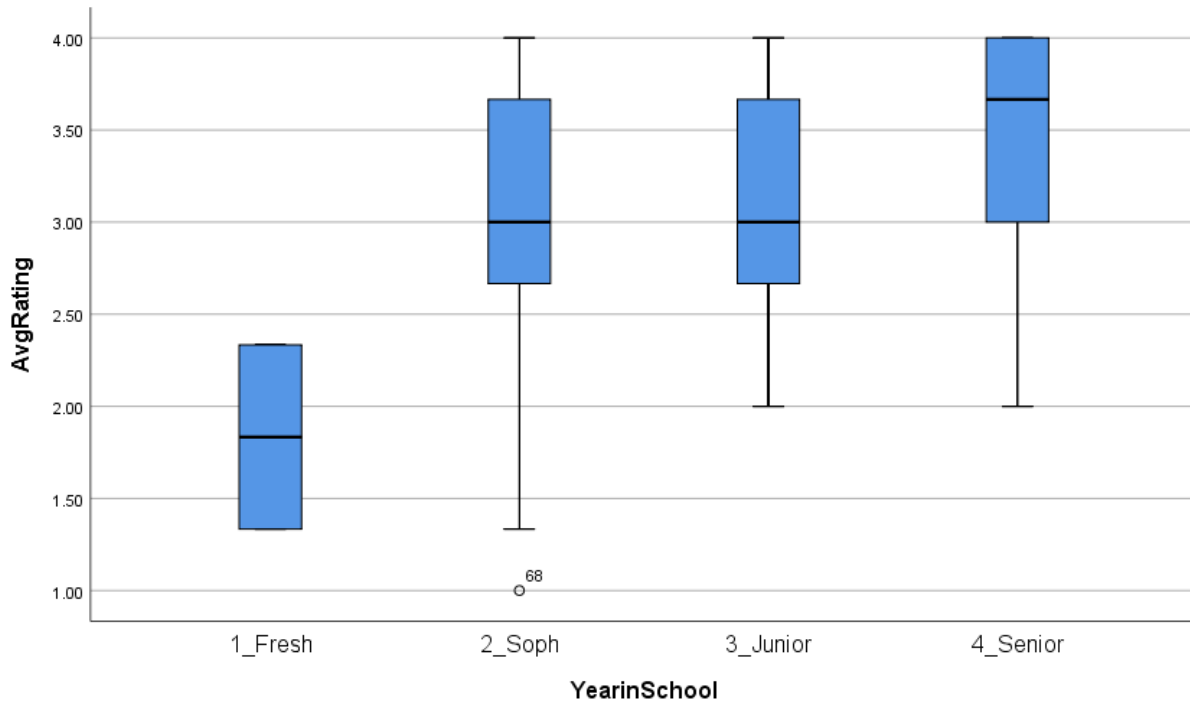
$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-.605}{.220} = -2.75$$

Skewness is significant at  $\alpha = .05$

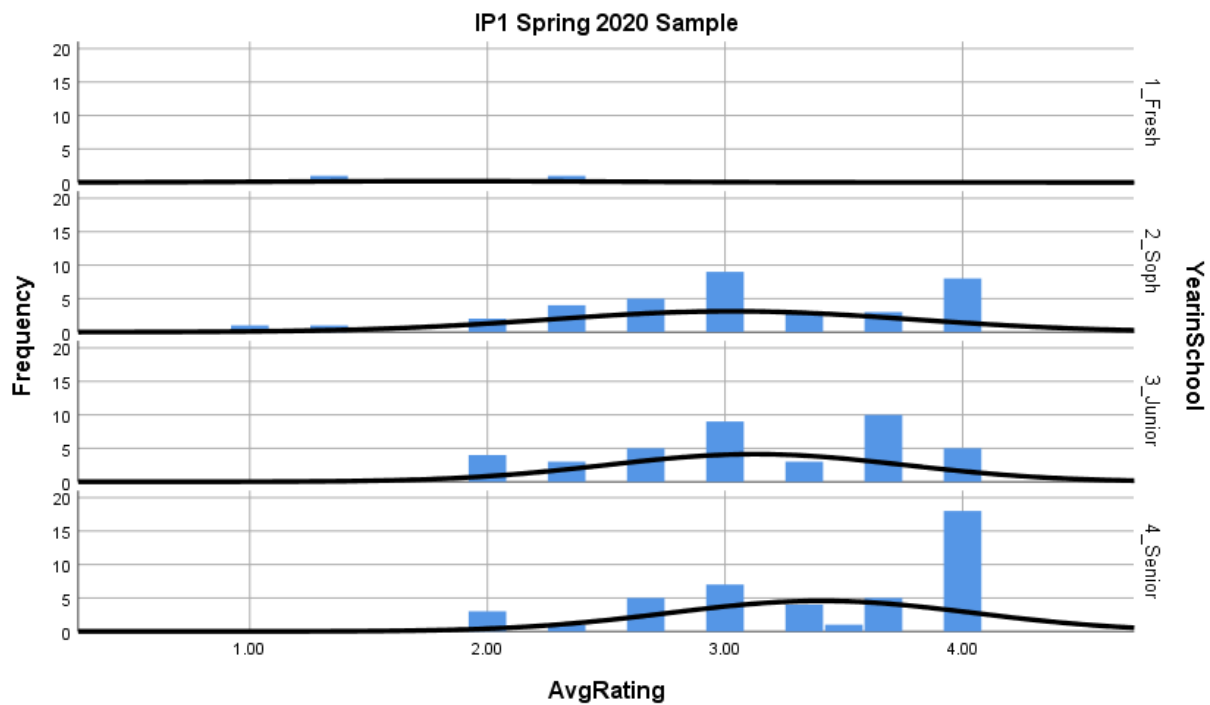
$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{-.214}{.437} = -0.4897$$

Kurtosis is not significant at  $\alpha = .05$

Distribution is not dramatically different from normal: large  $N$  yet data remains more discrete than other General Education categories. No outliers.



Boxplots revealed outliers for classes: However, outliers are not extreme because they are within the range of possible scores. Outliers were not removed.



Histograms reveal 1\_Fresh and 4\_Senior groups have the least normal distributions, with the 1\_Fresh group having a uniform distribution and  $n < 5$ . For each remaining class, the sampling distribution is  $n > 30$ . Nonparametric test chosen.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
AvgRating	121	3.1777	.71159	1.00	4.00
School Year	121	3.03	.856	1	4

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	2	3.25	6.50
	4	44	24.42	1074.50
	Total	46		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	3.500
Wilcoxon W	6.500
Z	-2.258
Asymp. Sig. (2-tailed)	.024
Exact Sig. [2*(1-tailed Sig.)]	.012 <sup>b</sup>

a. Grouping Variable: School Year

b. Not corrected for ties.

Significant difference between 1\_Fresh and 4\_Senior group distributions: AvgRating scores of Seniors ( $Mdn \approx 3.70$ ) were higher than AvgRating scores of Freshman ( $Mdn = 1.83$ )

$$U(N_4 = 44, N_1 = 2) = 3.500, p < \frac{.024}{2} < .05$$

Ranks				
	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	2	4.25	8.50
	3	39	21.86	852.50
	Total	41		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	5.500
Wilcoxon W	8.500
Z	-2.059
Asymp. Sig. (2-tailed)	.039
Exact Sig. [2*(1-tailed Sig.)]	.029 <sup>b</sup>

a. Grouping Variable: School Year

b. Not corrected for ties.

Significant difference between 1\_Fresh and 3\_Junior group distributions: AvgRating scores of Juniors ( $Mdn = 3.00$ ) were higher than AvgRating scores of Freshman ( $Mdn = 1.83$ )  
 $U(N_3 = 39, N_1 = 2) = 5.500, p < \frac{.039}{2} < .05$

Ranks				
	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	2	5.25	10.50
	2	36	20.29	730.50
	Total	38		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	7.500
Wilcoxon W	10.500
Z	-1.890
Asymp. Sig. (2-tailed)	.059
Exact Sig. [2*(1-tailed Sig.)]	.057 <sup>b</sup>

a. Grouping Variable: School Year

b. Not corrected for ties.

Significant difference between 1\_Fresh and 2\_Soph group distributions: AvgRating scores of Sophomores ( $Mdn = 3.00$ ) were higher than AvgRating scores of Freshman ( $Mdn = 1.83$ )  
 $U(N_2 = 36, N_1 = 2) = 7.500, p < \frac{.059}{2} < .05$

The ANOVA confirmed the finding and further showed significant differences between groups:

## Descriptives

AvgRating

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	2	1.8333	.70711	.50000	-4.5198	8.1864	1.33	2.33
2	36	3.0278	.76997	.12833	2.7673	3.2883	1.00	4.00
3	39	3.1282	.62882	.10069	2.9244	3.3320	2.00	4.00
4	44	3.4053	.64138	.09669	3.2103	3.6003	2.00	4.00
Total	121	3.1777	.71159	.06469	3.0496	3.3058	1.00	4.00

## Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
AvgRating	Based on Mean	.169	3	117	.917
	Based on Median	.150	3	117	.929
	Based on Median and with adjusted df	.150	3	110.001	.929
	Based on trimmed mean	.246	3	117	.864

No significant variance at  $p < .05$

## ANOVA

AvgRating

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.799	3	2.266	4.913	.003
Within Groups	53.964	117	.461		
Total	60.763	120			

At least one significant difference in group means at  $p < .05$

$F(3, 117) = 4.913, p < .05$

$$\eta^2 = \frac{SS_{between}}{SS_{total}} = \frac{6.799}{60.763} = .11$$

About 11% of the variance in average rating is predicted from school year.

## Contrast Coefficients

Contrast

School Year

	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

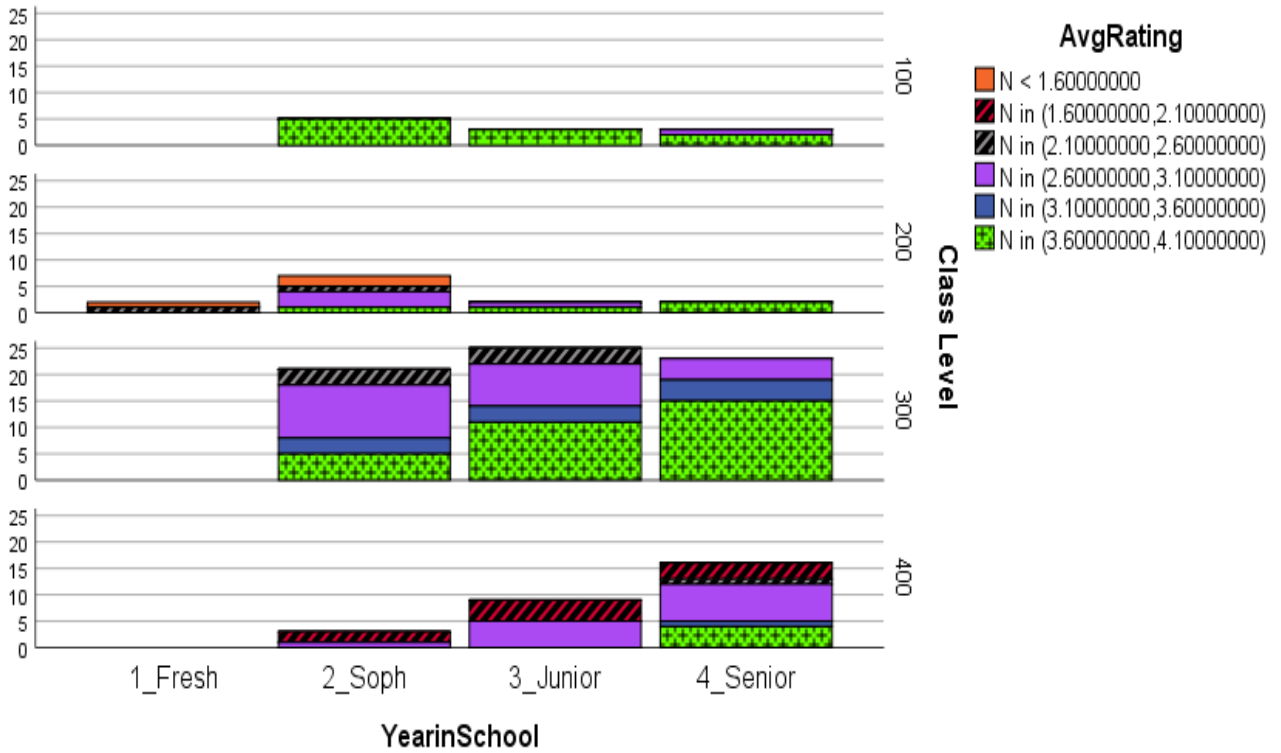
### Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
AvgRating	Assume equal variances	1	1.5720	.49102	3.201	117	.002
		2	1.2949	.49239	2.630	117	.010
		3	1.1944	.49339	2.421	117	.017
	Does not assume equal variances	1	1.5720	.50926	3.087	1.076	.185
		2	1.2949	.51004	2.539	1.083	.223
		3	1.1944	.51621	2.314	1.136	.235

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	1	1 CAS
200	1	1 CAS
300	2	1 Ed&Health
400	1	1 Ed&Health

### Average Rating Frequency Count by Class Level by Year in School

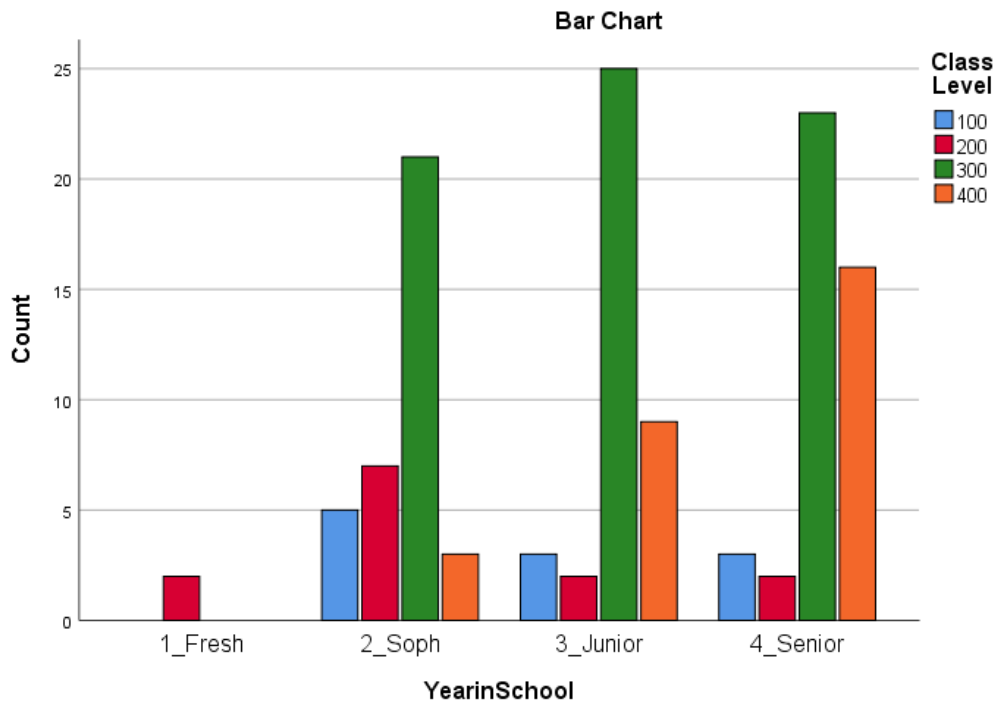
IP1 Spring 2020 Sample



### YearinSchool \* Class Level Crosstabulation

Count

		Class Level				Total
		100	200	300	400	
YearinSchool	1_Fresh	0	2	0	0	2
	2_Soph	5	7	21	3	36
	3_Junior	3	2	25	9	39
	4_Senior	3	2	23	16	44
Total		11	13	69	28	121



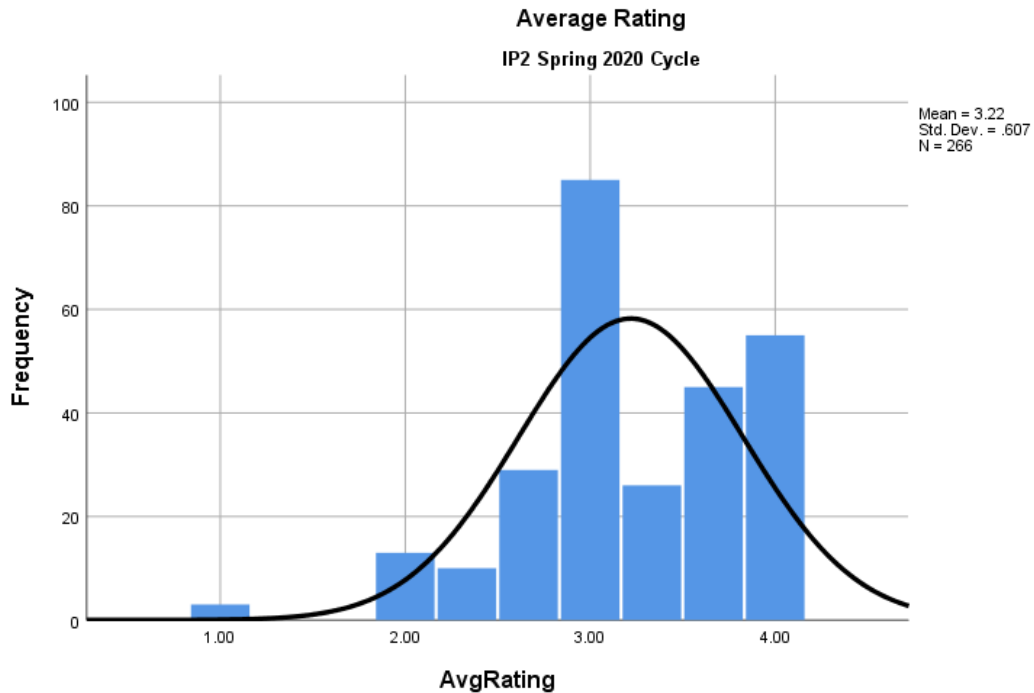
In this sample, only 2 freshman are represented in this general education category.

Roughly the same number of sophomores, juniors, and senior are represented in the sample, with seniors having the most representation.

57% of the sample are in the 300 Class Level

Almost all students earned an AvgRating = 4 in the 100 Class Level





### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
							Statistic	Std. Error	Statistic	Std. Error
AvgRating	266	1.00	4.00	3.2193	.60739	.369	-.659	.149	.732	.298
Valid N (listwise)	266									

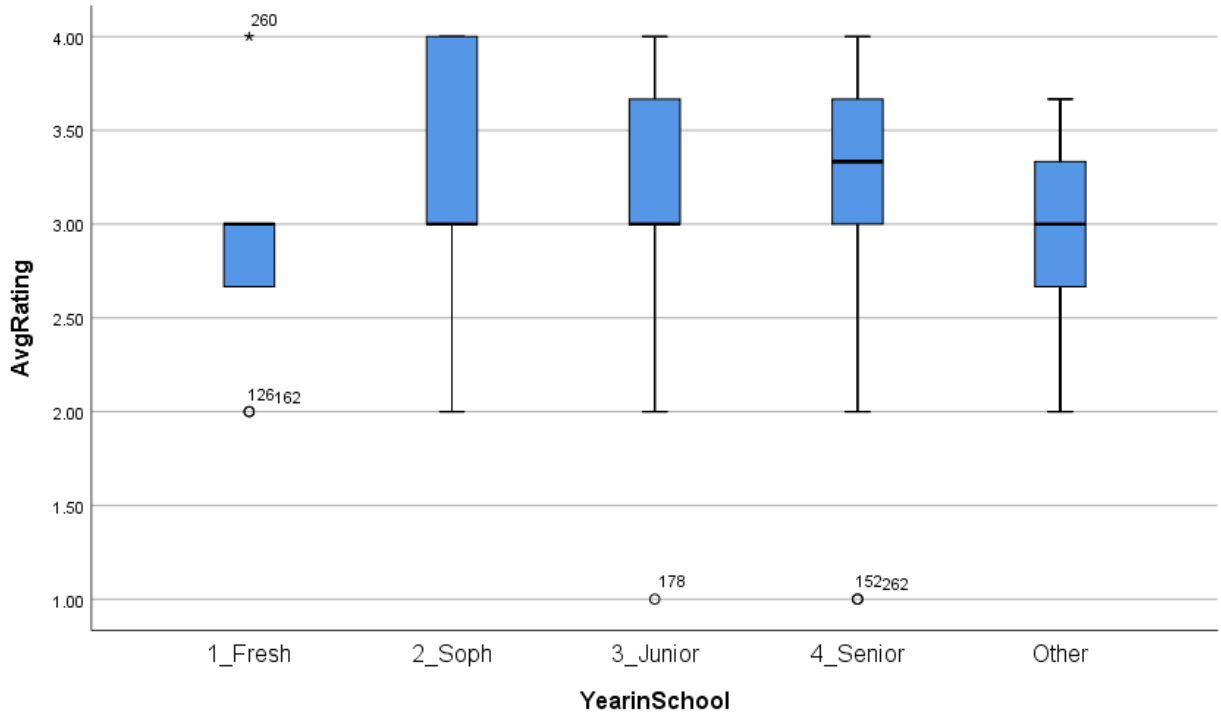
$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-.659}{.149} = -4.42$$

Skewness is significant at  $\alpha = .05$

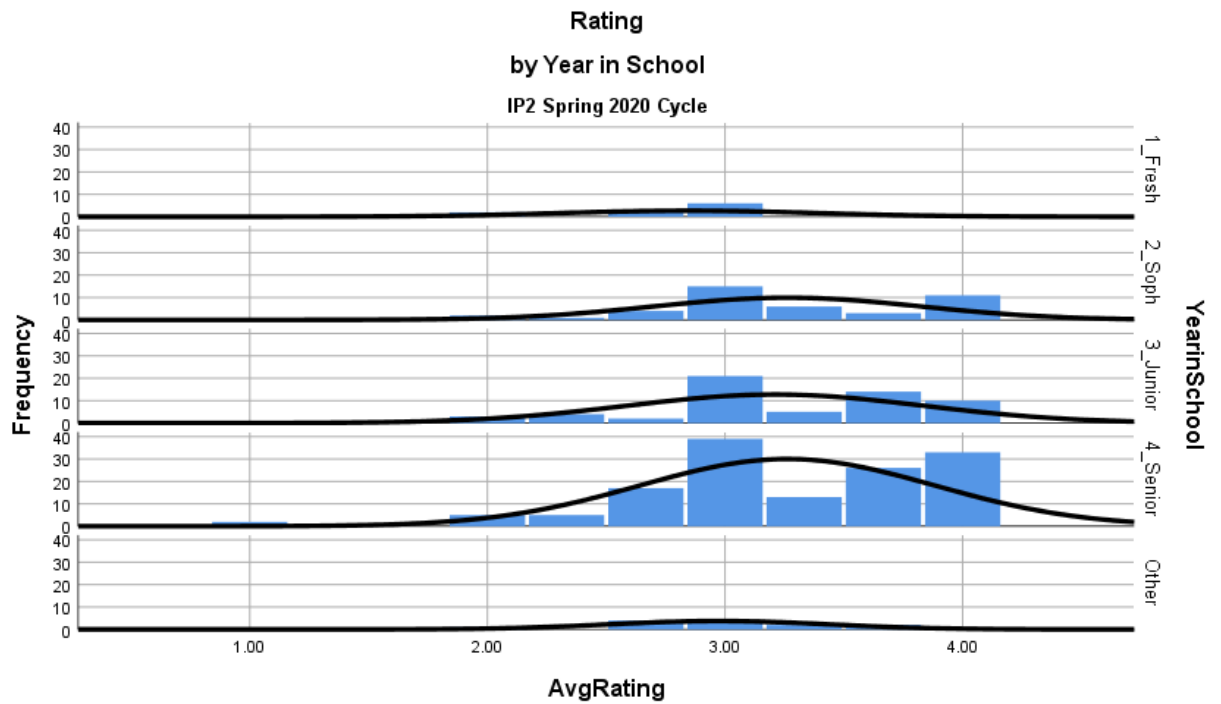
$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{.732}{.298} = 2.46$$

Kurtosis is significant at  $\alpha = .05$

Distribution is not dramatically different from normal, although more of a j-shaped pattern. No outliers.



Boxplots revealed outliers for classes: However, outliers are not extreme because they are within the range of possible scores. (Starred outlier is flagged as extreme by software.) Outliers were not removed.



Histograms reveal 1\_Fresh and 4\_Senior groups have the least normal distributions, with the 1\_Fresh group having  $n < 30$ . For each remaining group, the sampling distribution is  $n > 30$ . Nonparametric test chosen.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
AvgRating	266	3.2193	.60739	1.00	4.00
School Year	253	3.30	.898	1	4

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	11	48.23	530.50
	4	140	78.18	10945.50
	Total	151		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	464.500
Wilcoxon W	530.500
Z	-2.239
Asymp. Sig. (2-tailed)	.025

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 4\_Senior group distributions: AvgRating scores of Seniors ( $Mdn \approx 3.30$ ) were higher than AvgRating scores of Freshman ( $Mdn = 3.00$ )

$$U(N_4 = 140, N_1 = 11) = 464.500, p = \frac{.025}{2} < .05$$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	11	24.27	267.00
	3	60	38.15	2289.00
	Total	71		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	201.000
Wilcoxon W	267.000
Z	-2.123
Asymp. Sig. (2-tailed)	.034

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 3\_Junior group distributions: AvgRating scores of Juniors ( $Mdn = 3.00$ ) were higher than AvgRating scores of Freshman ( $Mdn = 3.00$ )  
 $U(N_3 = 60, N_1 = 11) = 201.000, p = \frac{.034}{2} < .05$

Ranks				
	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	11	18.32	201.50
	2	42	29.27	1229.50
	Total	53		

### Test Statistics<sup>a</sup>

AvgRating	
Mann-Whitney U	135.500
Wilcoxon W	201.500
Z	-2.180
Asymp. Sig. (2-tailed)	.029

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 2\_Soph group distributions: AvgRating scores of Sophomores ( $Mdn = 3.00$ ) were higher than AvgRating scores of Freshman ( $Mdn = 3.00$ )  
 $U(N_2 = 42, N_1 = 11) = 135.500, p = \frac{.029}{2} < .05$

The ANOVA omnibus test missed detecting significant findings due to the sensitivity of the mean. However, the planned contrasts confirmed the findings and further showed significant differences between groups:

### Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	11	2.85	.545	.164	2.48	3.21	2	4
2	42	3.26	.563	.087	3.09	3.44	2	4
3	60	3.21	.626	.081	3.05	3.37	1	4
4	140	3.26	.620	.052	3.16	3.37	1	4
Total	253	3.23	.612	.038	3.16	3.31	1	4

### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
AvgRating	Based on Mean	.640	3	249	.590
	Based on Median	.820	3	249	.484
	Based on Median and with adjusted df	.820	3	239.879	.484
	Based on trimmed mean	.576	3	249	.632

Insignificant variance at  $p < .05$

### ANOVA

AvgRating

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.807	3	.602	1.620	.185
Within Groups	92.589	249	.372		
Total	94.396	252			

**Missed** at least one significant difference in group means at  $p < .05$

### Contrast Coefficients

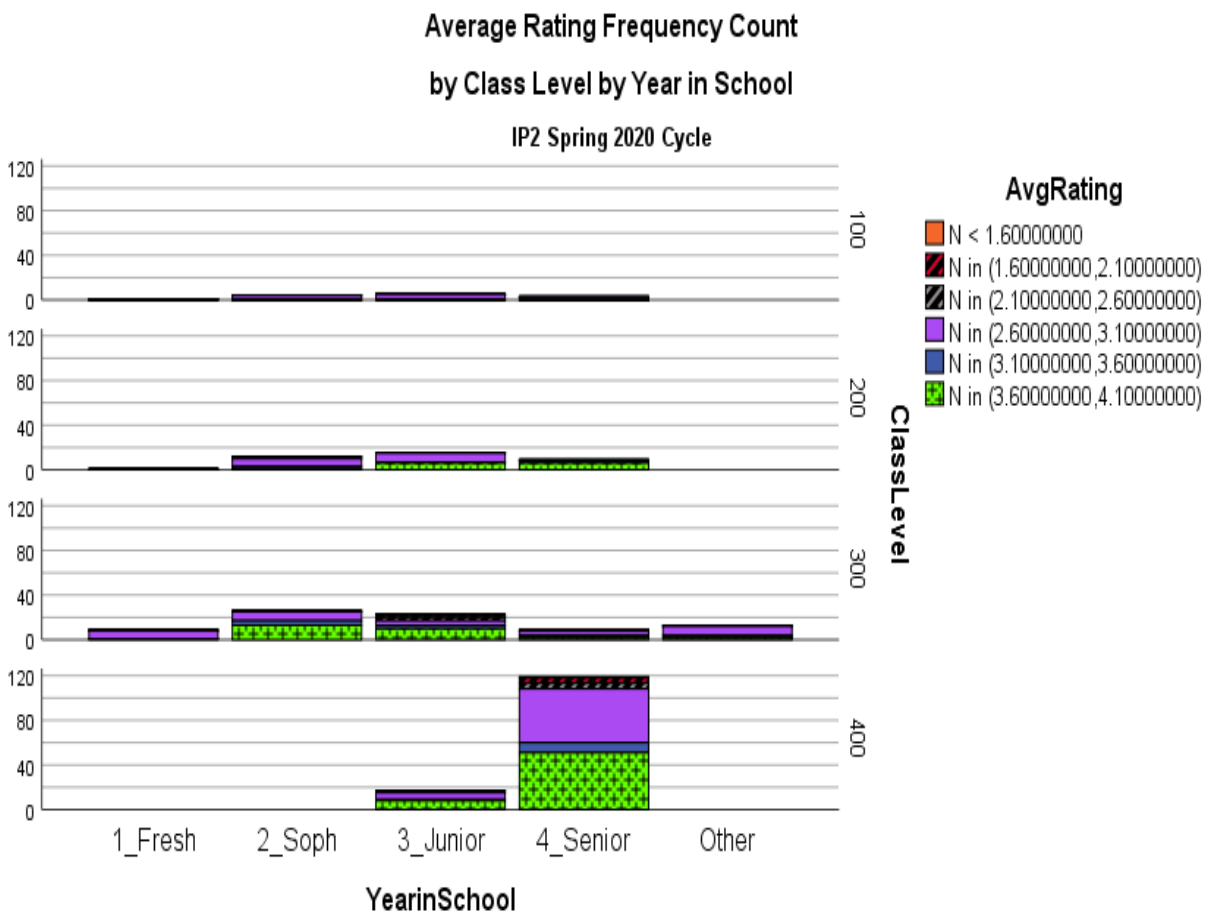
Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

### Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
AvgRating	Assume equal variances	1	.41	.191	2.165	249	.031
		2	.36	.200	1.813	249	.071
		3	.41	.207	2.002	249	.046
	Does not assume equal variances	1	.41	.172	2.397	12.132	.033
		2	.36	.183	1.981	15.268	.066
		3	.41	.186	2.224	16.072	.041

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	1	1 CAS
200	4:2	43.2%; 56.8% CAS; Ed&Health
300	2	70%; 30% COB; Ed&Health
400	1:2:5	23.5%; 14.7%; 61.8% COB; CAS; Ed&Health

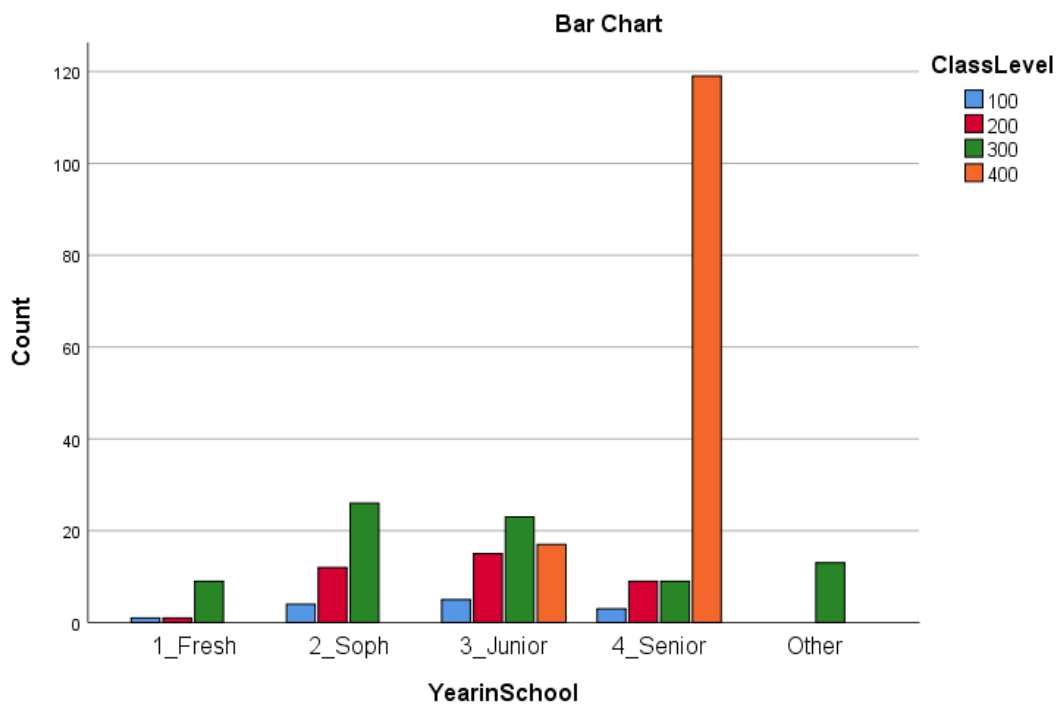
\*95 courses coded as 100 level



## YearinSchool \* ClassLevel Crosstabulation

Count

		ClassLevel				
		100	200	300	400	Total
YearinSchool	1_Fresh	1	1	9	0	11
	2_Soph	4	12	26	0	42
	3_Junior	5	15	23	17	60
	4_Senior	3	9	9	119	140
	Other	0	0	13	0	13
Total		13	37	80	136	266



In this sample, most students earn this general education credit from 300-level and 400-level classes, with 51% from 400-level classes. In this sample, 82% of Freshmen earn this credit from 300-level classes and 0% from 400-level classes, 62% of Sophomores earn this credit from 300-level classes and 0% from 400-level classes, 38% of Juniors earn this credit from 300-level classes and 28% from 400-level classes, 6% of Seniors earn this credit from 300-level classes and 85% from 400-level classes. In the 300-level classes, Sophomores rate higher than Juniors, and Juniors rate higher than Seniors.





## CCS 3 Data Analysis Method and Procedures

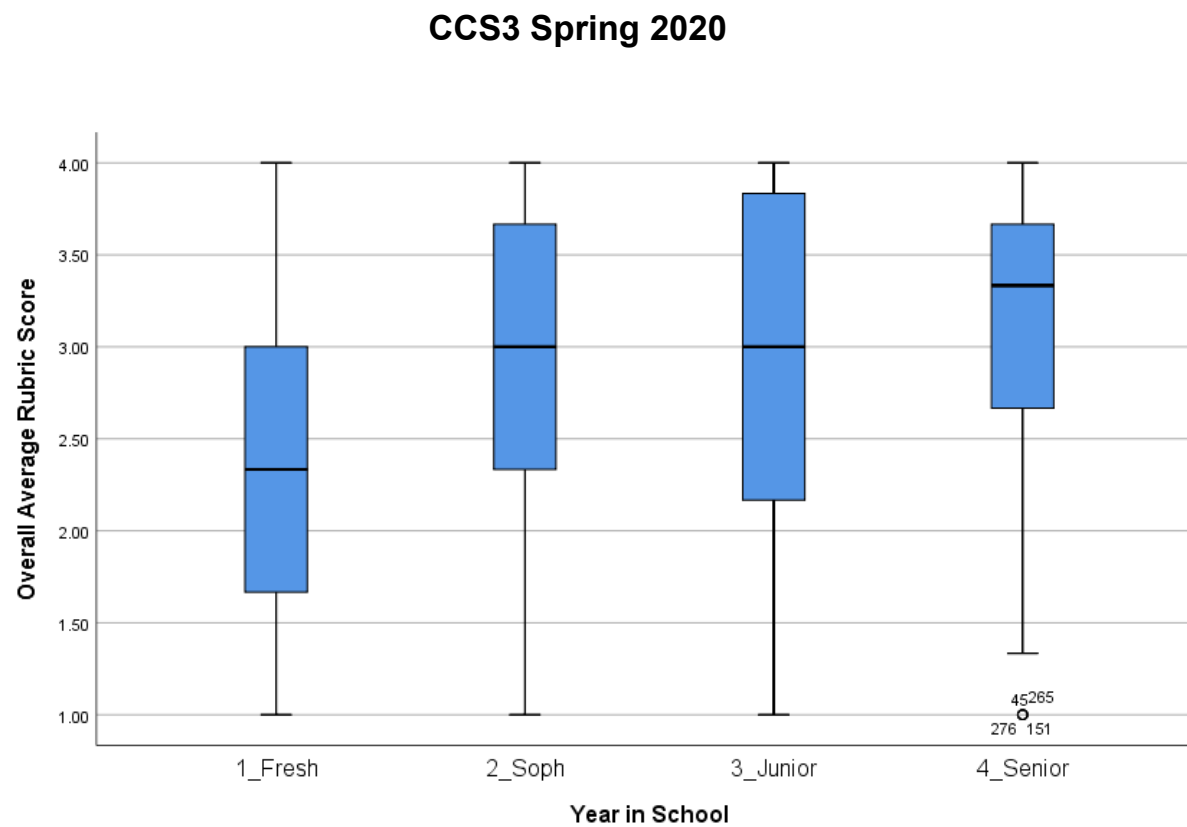
$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-.493}{.129} = -3.822$$

Skewness is significant at  $\alpha = .05$

$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{-.802}{.257} = 3.1206$$

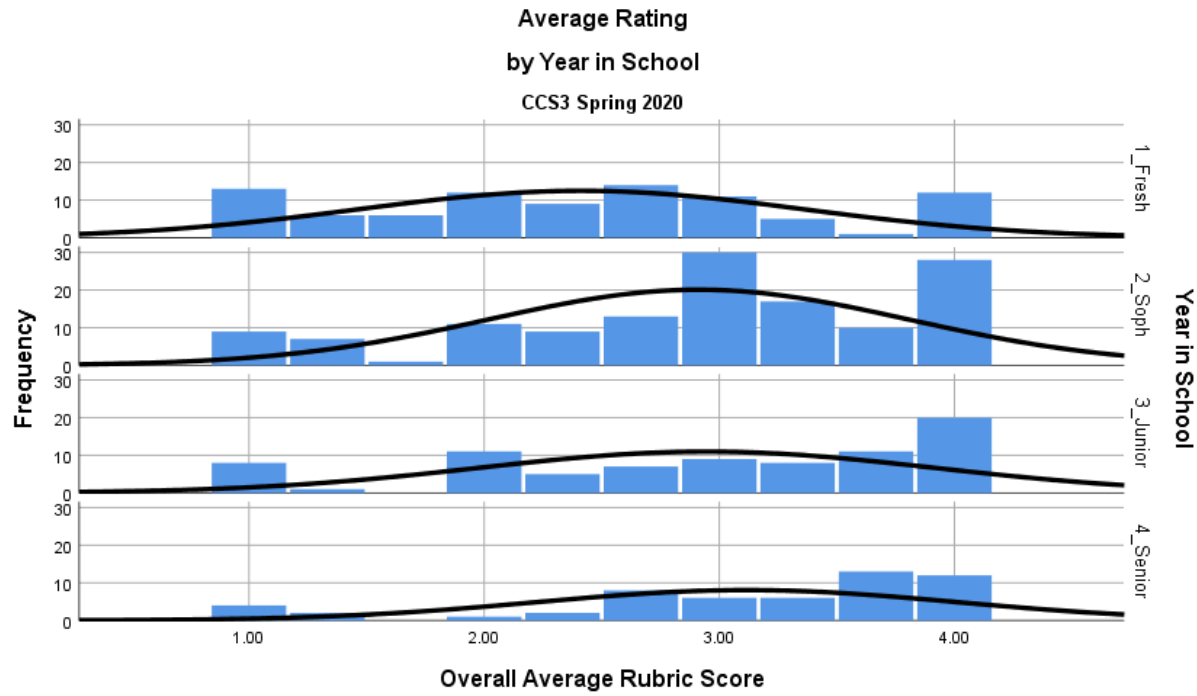
Kurtosis is significant at  $\alpha = .05$

Distribution is not dramatically different from normal. No floor or ceiling effect.  
No outliers.



Boxplots revealed outliers for classes: However, outliers are not extreme because they are within the range of possible scores. Outliers were not removed.

## CCS 3 Data Analysis Method and Procedures



Histograms reveal 3\_Junior and 4\_Senior groups have the least normal distributions. For each class, the sampling distribution is  $n > 30$ .

Planned contrasts for the ANOVA (Warner, 2013, pp. 240 – 243):

1. Freshman to Senior
2. Freshman to Junior
3. Freshman to Sophomore

-1	0	0	1
-1	0	1	0
-1	1	0	0

$$H_a: \bar{X}_F < \bar{X}_{Sr}, \alpha = .05$$

$$H_a: \bar{X}_F < \bar{X}_J$$

$$H_a: \bar{X}_F < \bar{X}_{So}$$

## CCS 3 Data Analysis Method and Procedures

### Descriptives

Overall Average Rubric Score

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	89	2.4120	.94818	.10051	2.2122	2.6117	1.00	4.00
2	135	2.9111	.89331	.07688	2.7590	3.0632	1.00	4.00
3	80	2.9458	.96993	.10844	2.7300	3.1617	1.00	4.00
4	54	3.1173	.89057	.12119	2.8742	3.3604	1.00	4.00
Total	358	2.8259	.95320	.05038	2.7268	2.9250	1.00	4.00

### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Overall Average Rubric Score	Based on Mean	.925	3	354	.429
	Based on Median	1.168	3	354	.322
	Based on Median and with adjusted df	1.168	3	350.246	.322
	Based on trimmed mean	.981	3	354	.402

No significant variance at  $p < .05$

### ANOVA

Overall Average Rubric Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.964	3	7.321	8.570	.000
Within Groups	302.405	354	.854		
Total	324.369	357			

At least one significant difference in group means at  $p < .05$

$$F(3, 354) = 8.570, p < .001$$

$$\eta^2 = \frac{SS_{between}}{SS_{total}} = \frac{21.964}{324.369} = .07$$

About 7% of the variance in average rating is predicted from school year.

## CCS 3 Data Analysis Method and Procedures

### Contrast Coefficients

Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

### Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
Overall Average Rubric Score	Assume equal variances	1	.7053	.15943	4.424	354	.000
		2	.5338	.14240	3.749	354	.000
		3	.4991	.12620	3.955	354	.000
	Does not assume equal variances	1	.7053	.15744	4.480	117.500	.000
		2	.5338	.14786	3.611	164.228	.000
		3	.4991	.12654	3.944	180.527	.000

### Remaining Results:

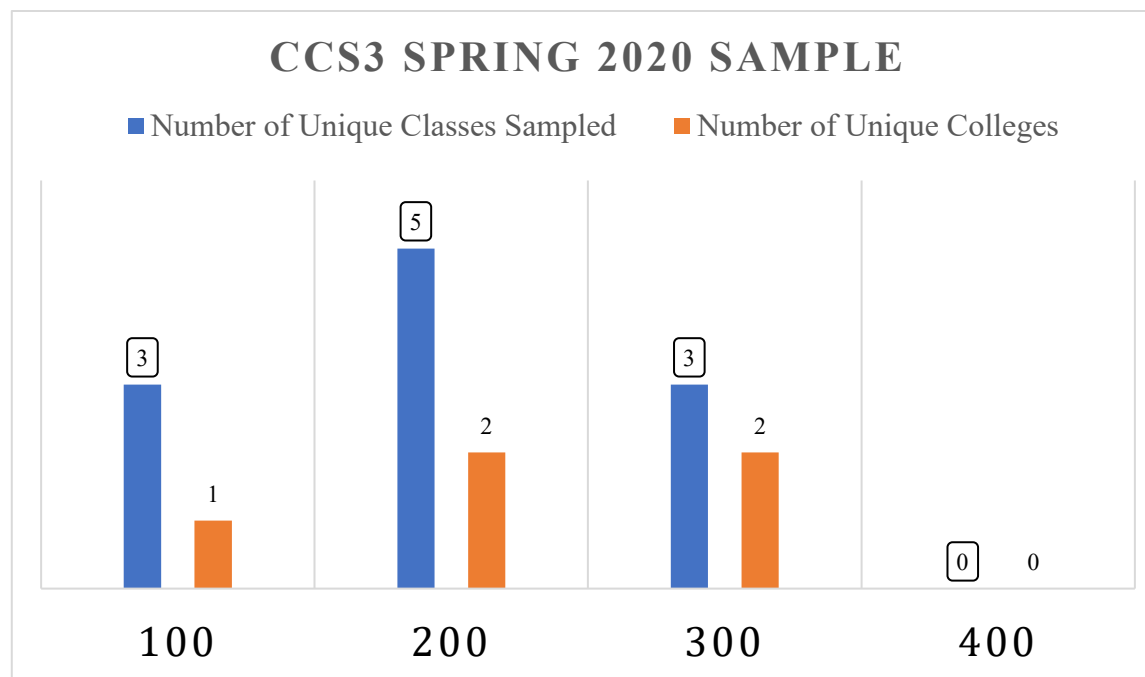
Planned contrast 1 (comparing the mean of Group 1, Freshman, to the mean of Group 4, Senior) is significant:  $t(354) = 4.424, p < .001$ . The mean average CCS 3 rating for Freshman ( $M = 2.41$ ) is significantly lower than the mean average CCS 3 rating for Senior ( $M = 3.12$ ).

Planned contrast 2 (comparing the mean of Group 1, Freshman, to the mean of Group 3, Junior) is significant:  $t(354) = 3.749, p < .001$ . The mean average CCS 3 rating for Freshman ( $M = 2.41$ ) is significantly lower than the mean average CCS 3 rating for Junior ( $M = 2.95$ ).

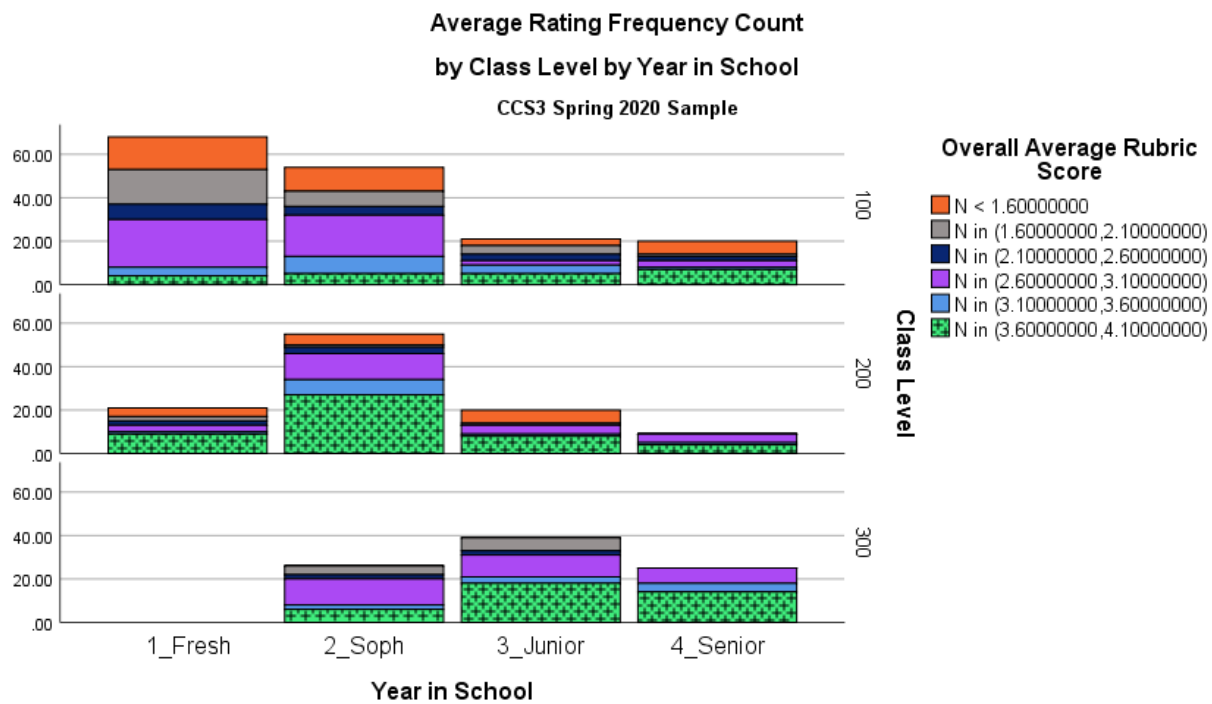
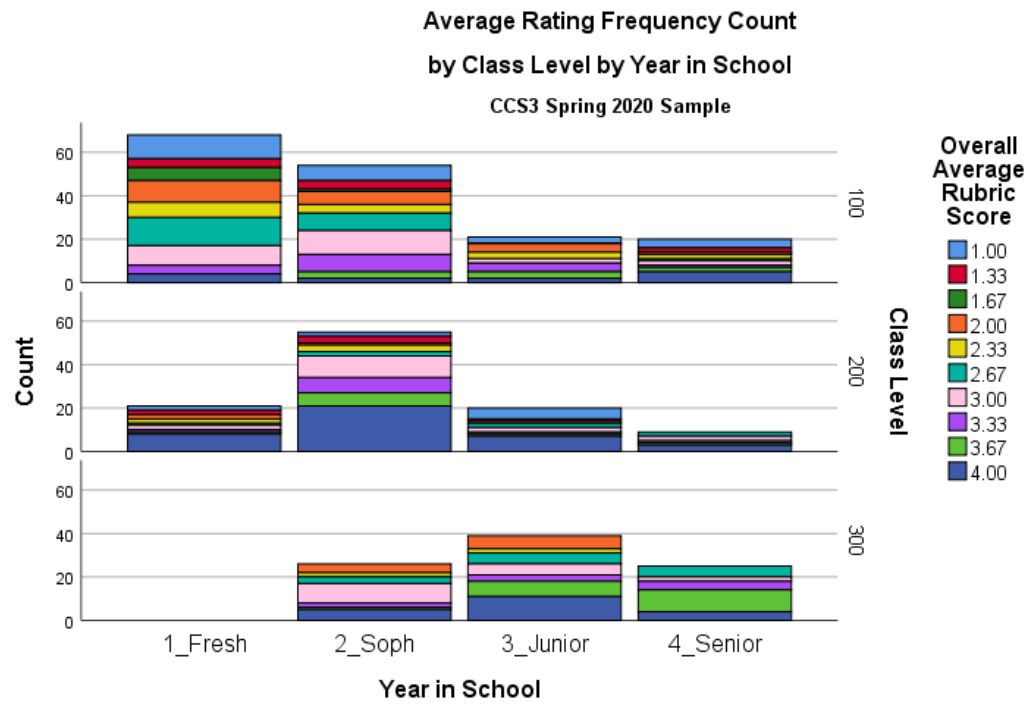
Planned contrast 3 (comparing the mean of Group 1, Freshman, to the mean of Group 2, Sophomore) is significant:  $t(354) = 3.955, p < .001$ . The mean average CCS 3 rating for Freshman ( $M = 2.41$ ) is significantly lower than the mean average CCS 3 rating for Sophomore ( $M = 2.91$ ).

## CCS 3 Data Analysis Method and Procedures

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	3	1 CAS
200	5 = 1:4	1st = 40%, 2nd = 60% (Ed&Health: CAS)
300	3 = 2:1	1st = 73.3%, 2nd = 26.7% (Ed&Health: CAS)
400	0	0



# CCS 3 Data Analysis Method and Procedures



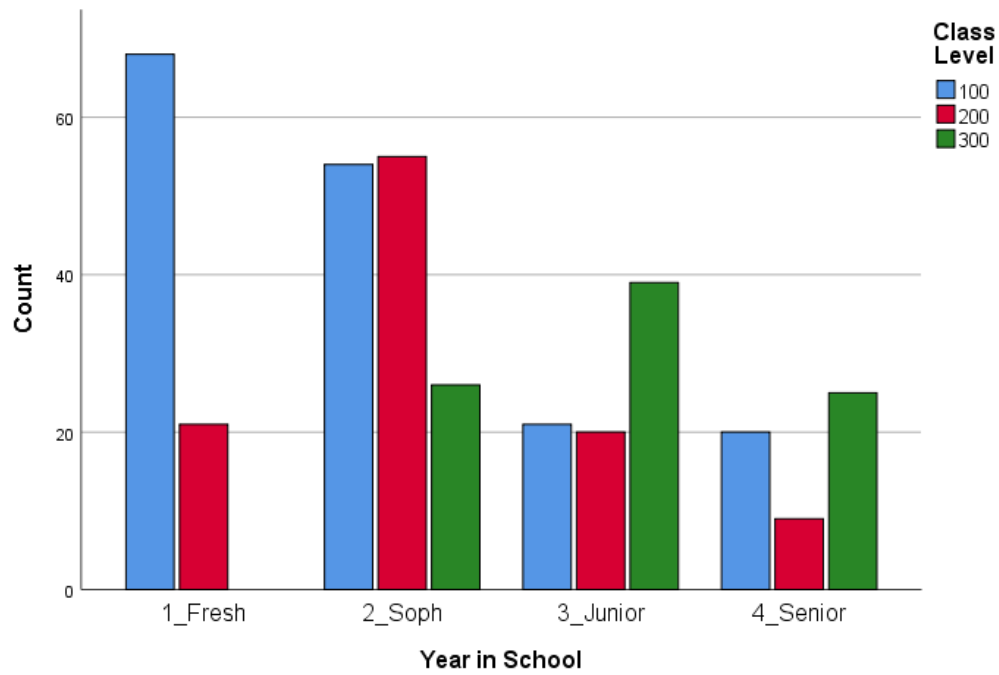
# CCS 3 Data Analysis Method and Procedures

## Year in School \* Class Level Crosstabulation

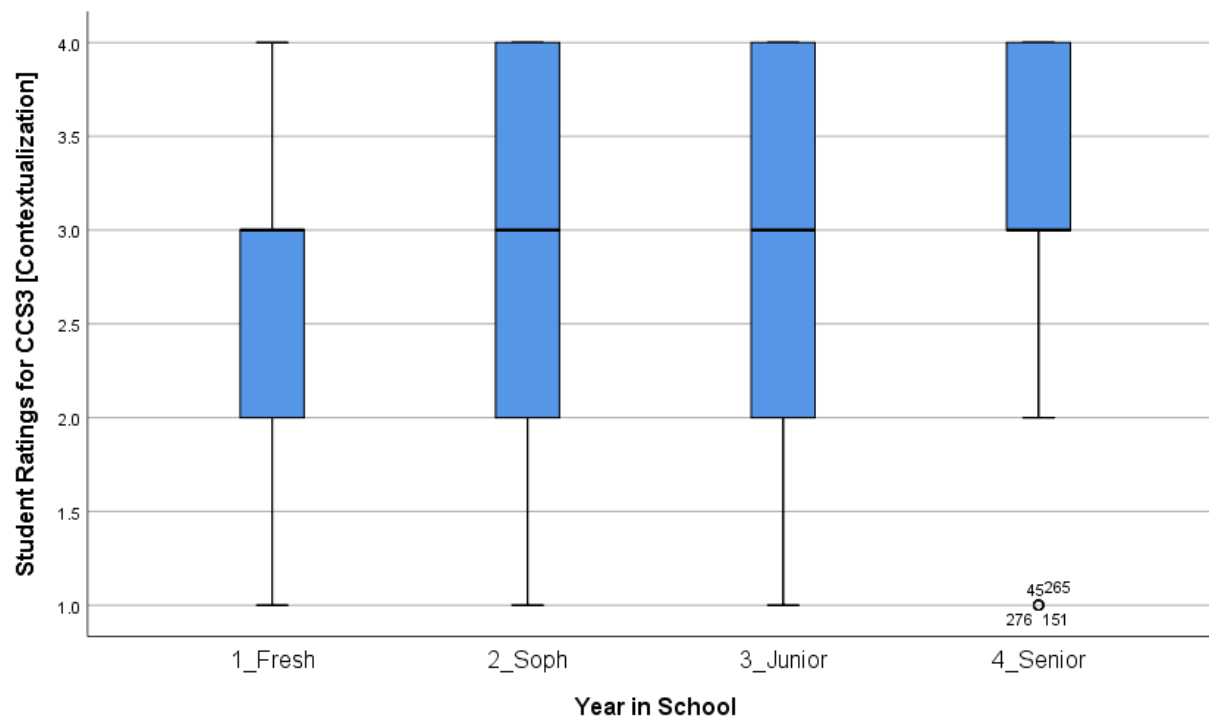
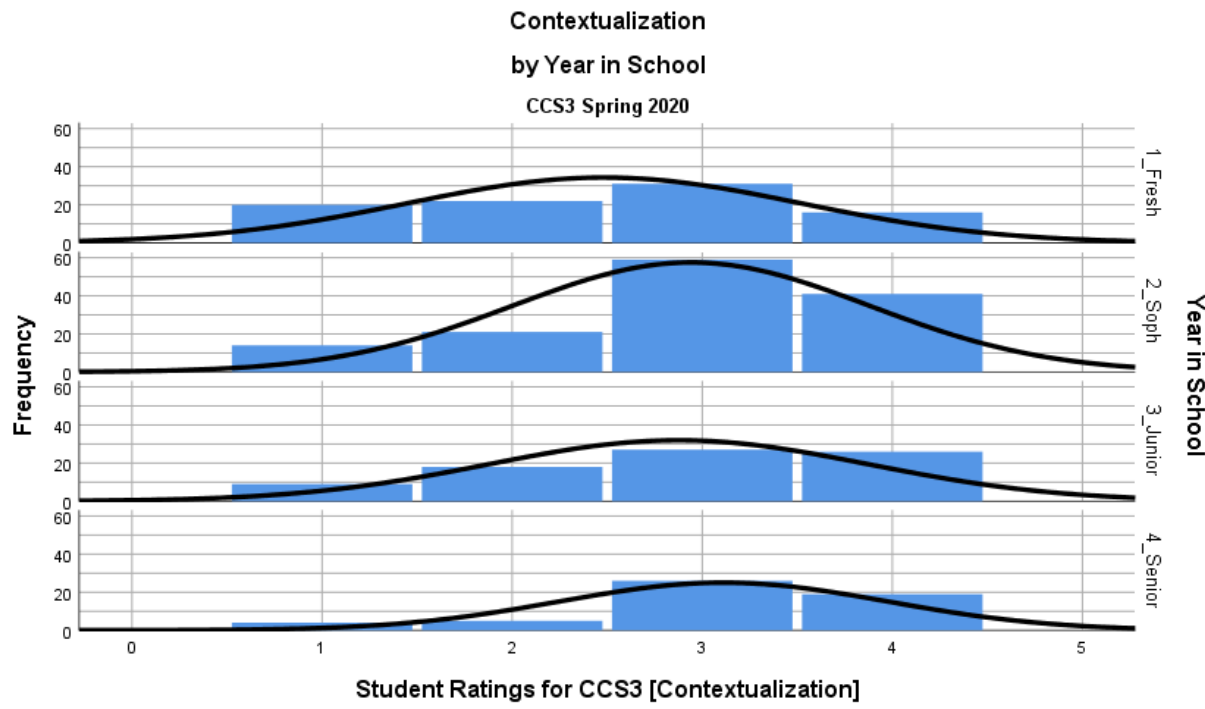
Count

		Class Level			Total
		100	200	300	
Year in School	1_Fresh	68	21	0	89
	2_Soph	54	55	26	135
	3_Junior	21	20	39	80
	4_Senior	20	9	25	54
Total		163	105	90	358

Bar Chart

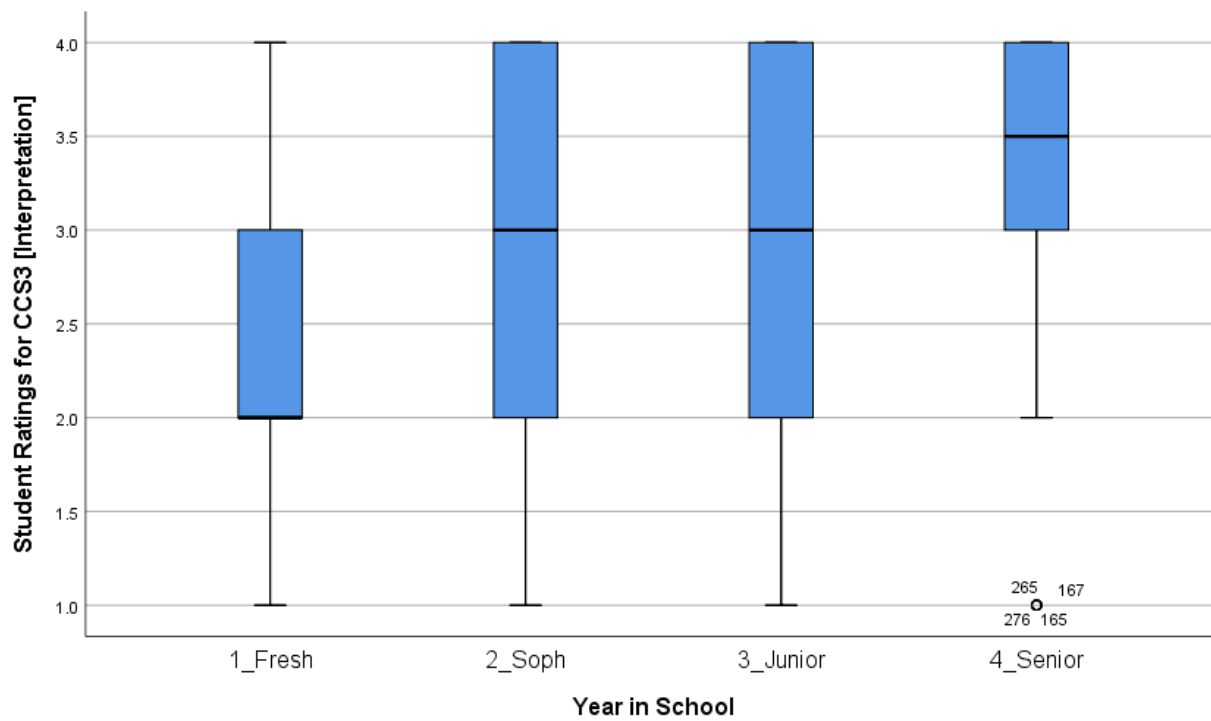
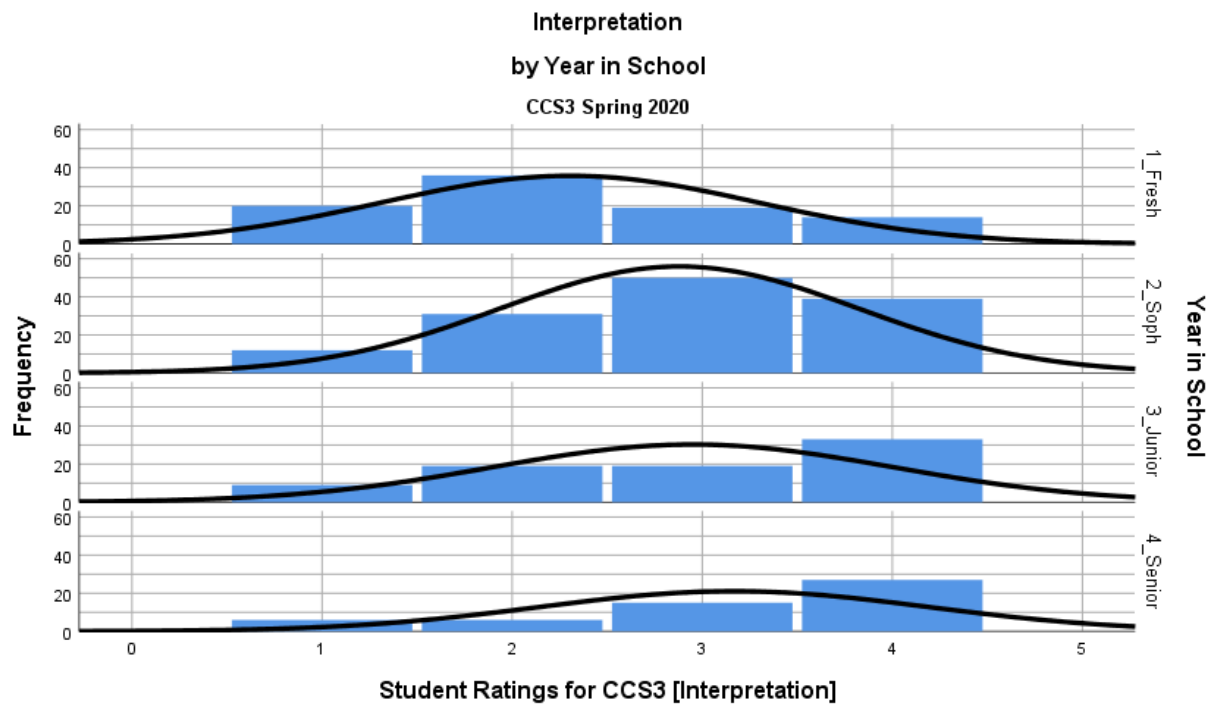


## Subcategories





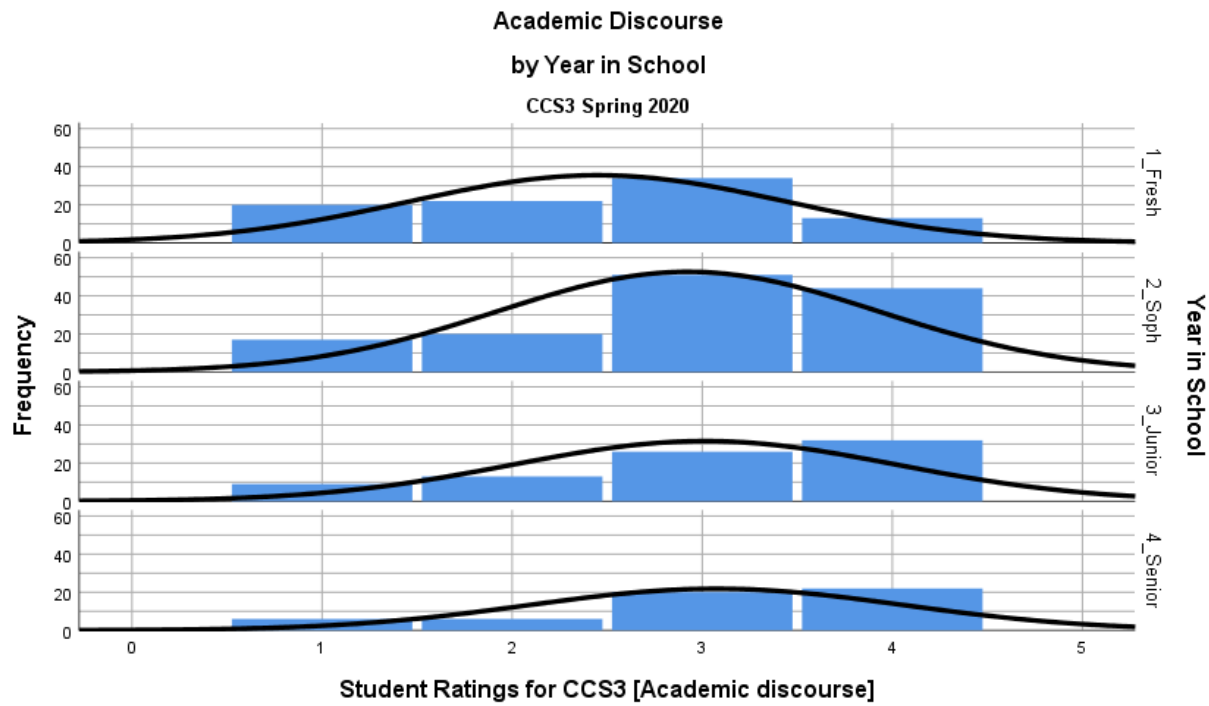
# CCS 3 Data Analysis Method and Procedures



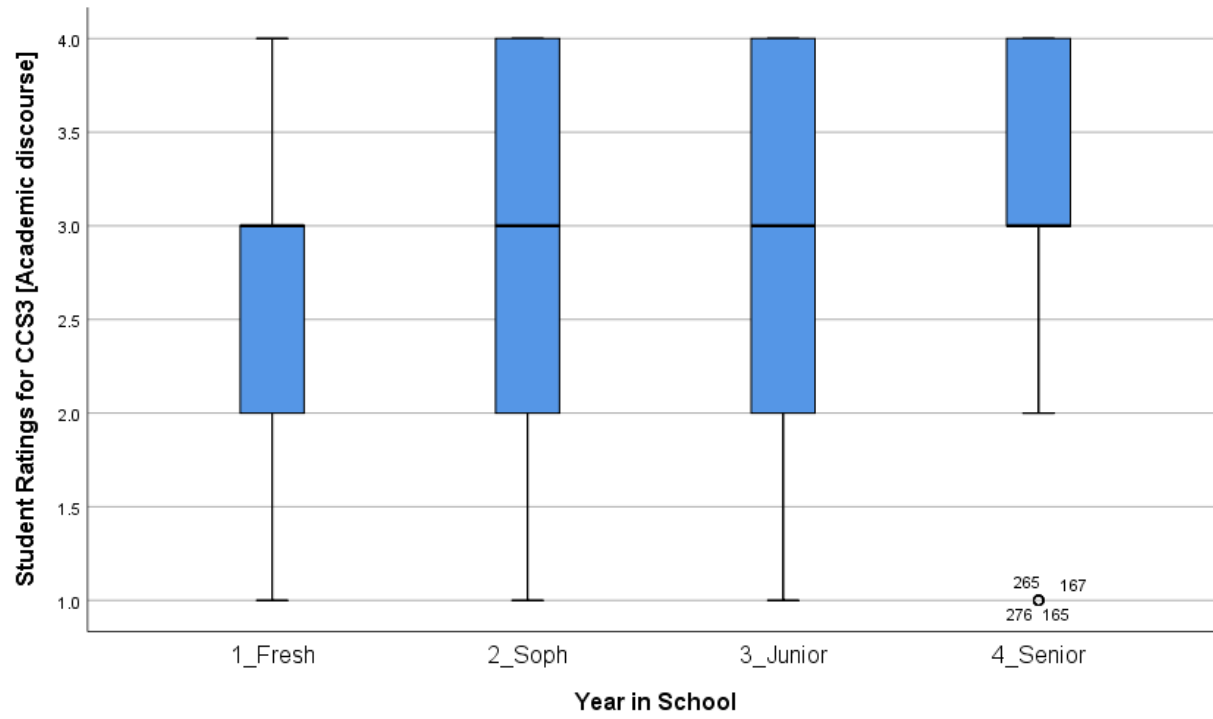
# CCS 3 Data Analysis Method and Procedures

## Case Processing Summary

	Year in School	Valid		Cases Missing		Total	
		N	Percent	N	Percent	N	Percent
Student Ratings for CCS3	1_Fresh	89	100.0%	0	0.0%	89	100.0%
[Interpretation]	2_Soph	132	97.8%	3	2.2%	135	100.0%
	3_Junior	80	100.0%	0	0.0%	80	100.0%
	4_Senior	54	100.0%	0	0.0%	54	100.0%

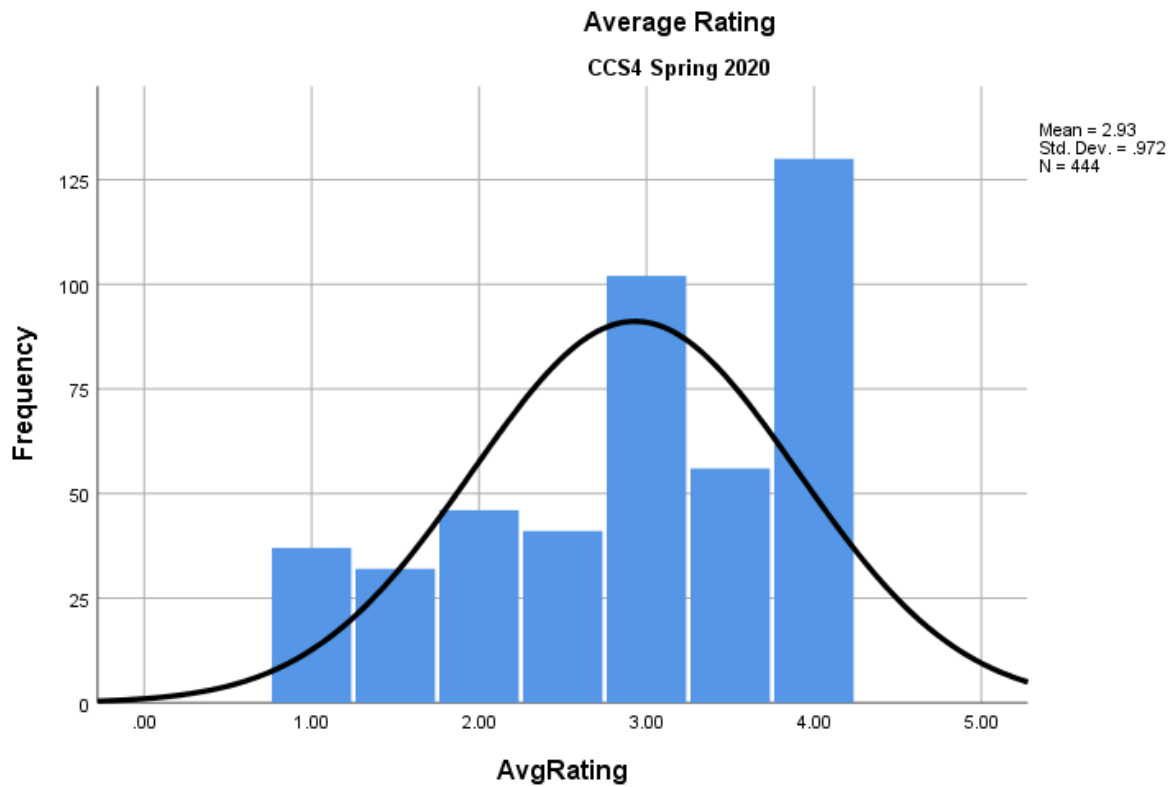


# CCS 3 Data Analysis Method and Procedures



## Case Processing Summary

	Year in School	Valid		Cases Missing		Total	
		N	Percent	N	Percent	N	Percent
Student Ratings for CCS3 [Academic discourse]	1_Fresh	89	100.0%	0	0.0%	89	100.0%
	2_Soph	132	97.8%	3	2.2%	135	100.0%
	3_Junior	80	100.0%	0	0.0%	80	100.0%
	4_Senior	54	100.0%	0	0.0%	54	100.0%



**Descriptive Statistics**

	N	Minimu	Maximu	Mean	Std.	Varian	Skewness		Kurtosis	
		m	m				Deviation	ce	Statisti	Std.
	Statisti	Statisti	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
AvgRating	444	1.00	4.00	2.9313	.97155	.944	-.573	.116	-.811	.231
Valid N (listwise)	444									

$$z = \frac{skewness}{SE_{skewness}} = \frac{-.573}{.116} = -4.94$$

Skewness is significant at  $\alpha = .05$

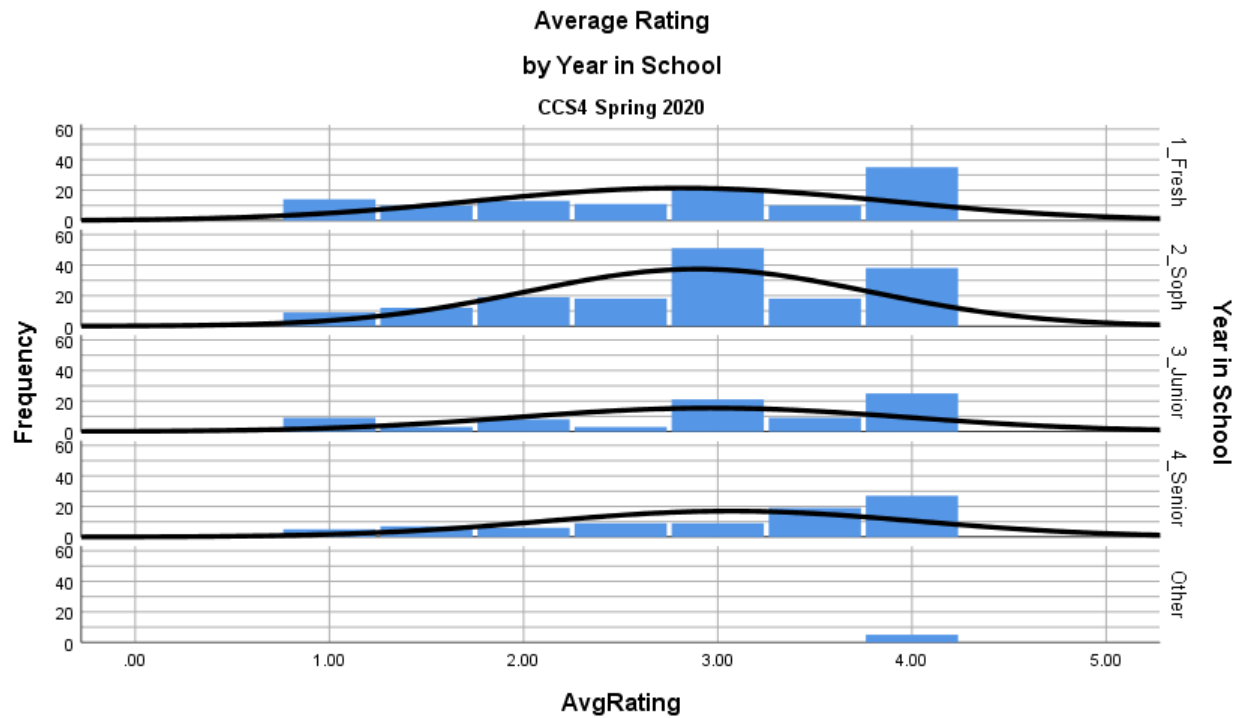
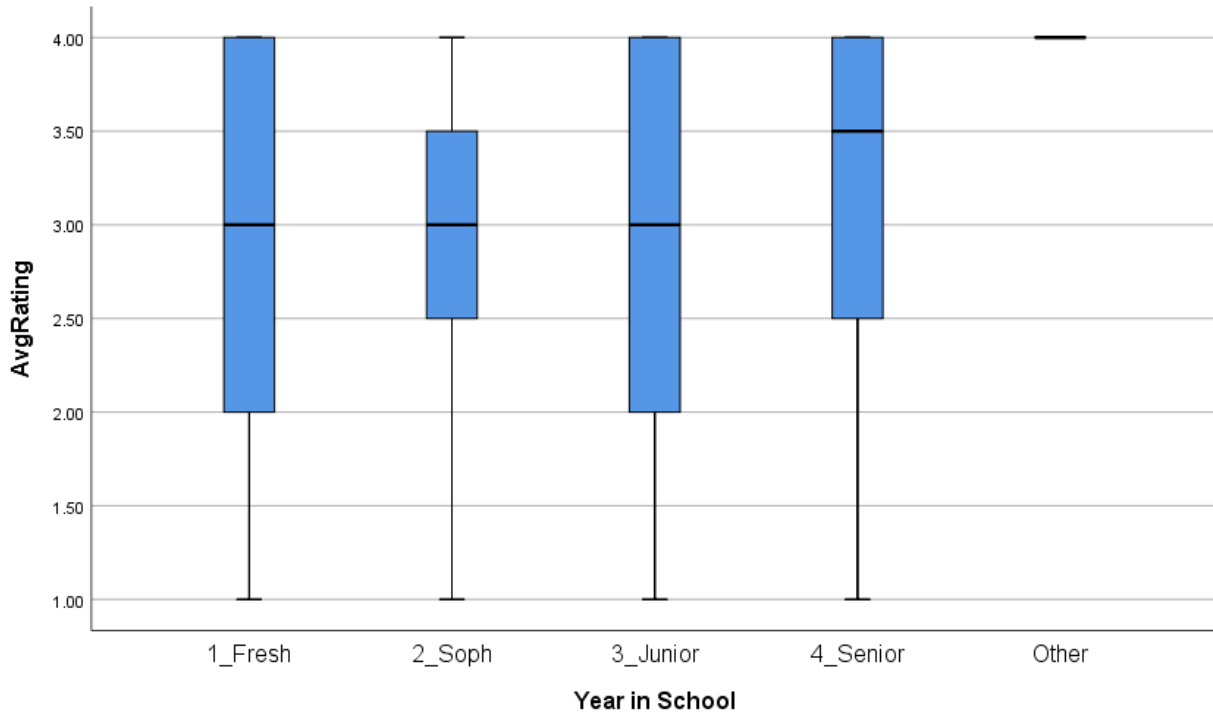
$$z = \frac{Excess\ kurtosis}{SE_{kurtosis}} = \frac{-.811}{.231} = 3.51$$

Kurtosis is significant at  $\alpha = .05$

Distribution is nonnormal: j-shaped. No floor or ceiling effect. No outliers. (Warner, 2013, p. 153)

◆ CCS4 has two (2) categories. Students are rated per category with no overall rating. I am calculating an overall average rating per student (AvgRating) so that the Central Limit Theorem (CLT) applies when  $N > 30$  and because we are interested in broad trends. The CLT seems to be applicable to the data, although

some dependence in the samples appears to be present. ANOVA is robust to non-normal distributions of data. Alternatively, nonparametric analysis is an option.



No outliers. Distributions are fairly flat for 1\_Fresh and 2\_Soph and exponential for 4\_Senior.

Nonparametric test chosen.

**Descriptive Statistics**

	N	Mean	Std. Deviation	Minimum	Maximum
AvgRating	444	2.9313	.97155	1.00	4.00
School Year	439	2.29	1.050	1	4

**Ranks**

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	114	93.26	10631.50
	4	82	105.79	8674.50
	Total	196		

**Test Statistics<sup>a</sup>**

	AvgRating
Mann-Whitney U	4076.500
Wilcoxon W	10631.500
Z	-1.558
Asymp. Sig. (2-tailed)	.119

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 4\_Senior group distributions at  $p < .05$

The ANOVA confirmed the finding and further showed no significant difference between any groups:

**Test of Homogeneity of Variances**

		Levene Statistic	df1	df2	Sig.
AvgRating	Based on Mean	3.679	3	435	.012
	Based on Median	2.777	3	435	.041
	Based on Median and with adjusted df	2.777	3	420.483	.041
	Based on trimmed mean	3.727	3	435	.011

significant variance at  $p < .05$

**ANOVA**

AvgRating

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.385	3	1.128	1.200	.309
Within Groups	408.995	435	.940		
Total	412.379	438			

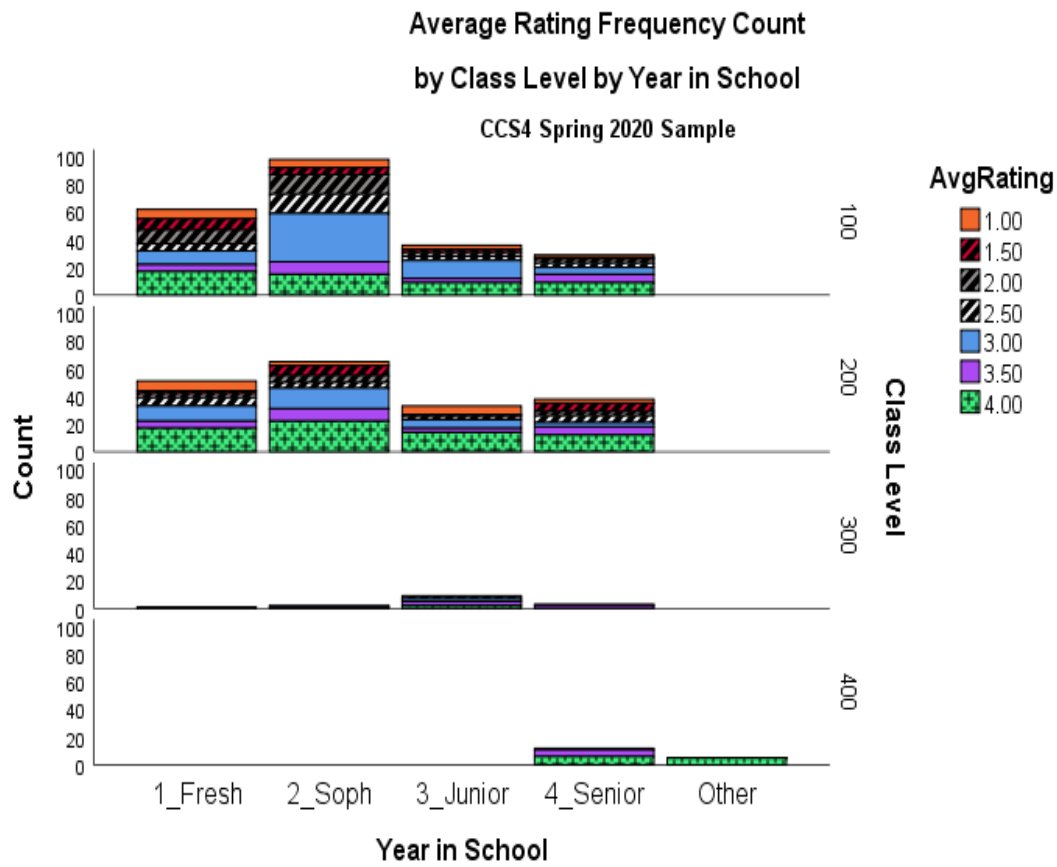
No significant difference in group means at  $p < .05$

### Descriptives

AvgRating

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	114	2.8114	1.06304	.09956	2.6142	3.0087	1.00	4.00
2	165	2.8970	.88085	.06857	2.7616	3.0324	1.00	4.00
3	78	2.9679	1.01079	.11445	2.7401	3.1958	1.00	4.00
4	82	3.0671	.96469	.10653	2.8551	3.2790	1.00	4.00
Total	439	2.9191	.97031	.04631	2.8281	3.0102	1.00	4.00

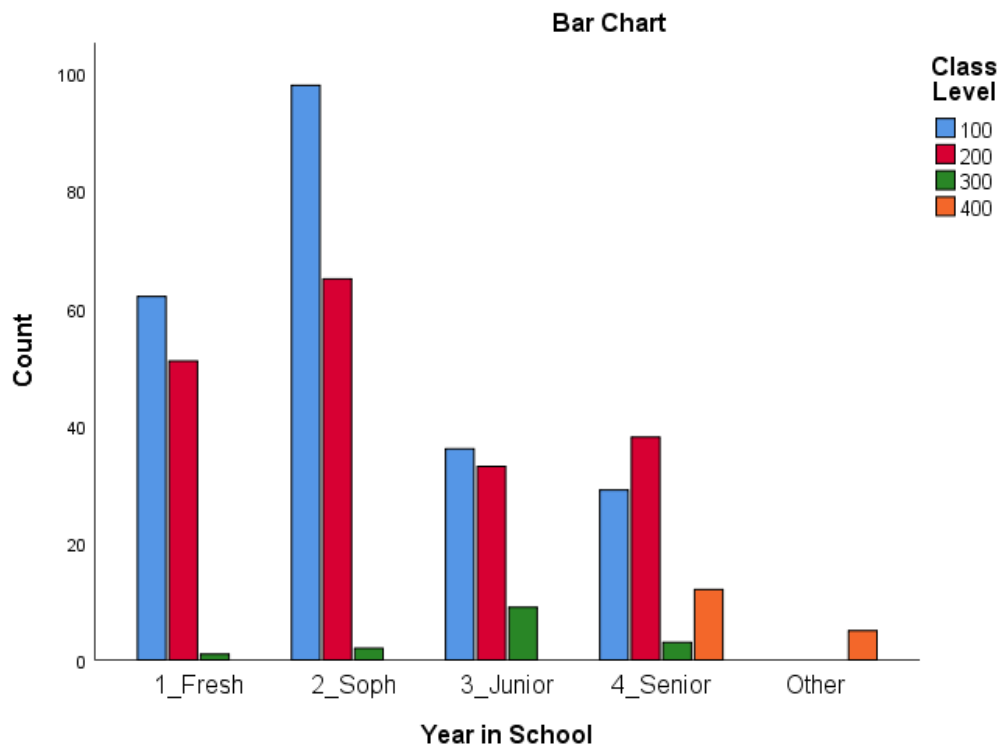
Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	5	1 CAS
200	5 = 2:1:2	1st = 25.7%, 2nd = 54.5%, 3rd = 19.8% (COB, CAS, Ed&Health)
300	1	1 CAS
400	2	1 Ed&Health



**Year in School \* Class Level Crosstabulation**

Year in School		Class Level				Total
		100	200	300	400	
Year in School	1_Fresh	62	51	1	0	114
	2_Soph	98	65	2	0	165
	3_Junior	36	33	9	0	78
	4_Senior	29	38	3	12	82
	Other	0	0	0	5	5
Total		225	187	15	17	444



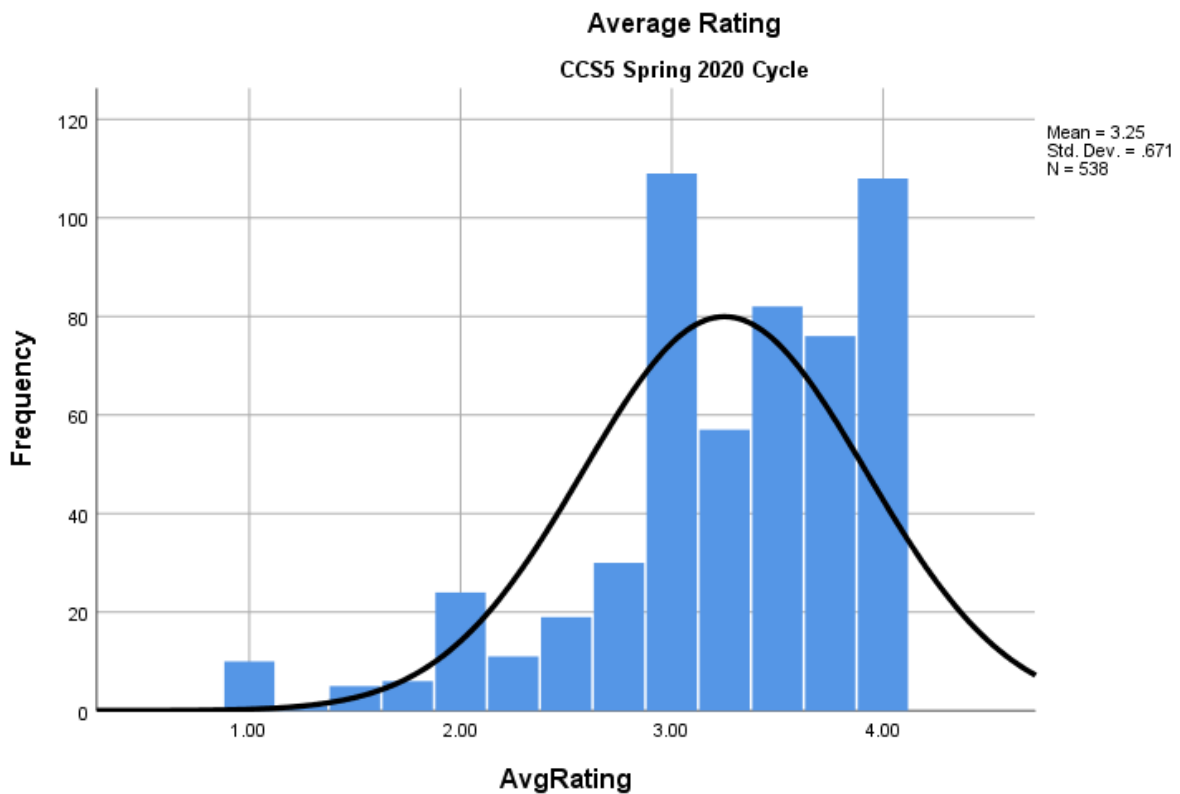


92.8% of students completed CCS4 in 100- and 200-level courses.

At the 100 level, 5 unique courses were sampled.

At the 200 level, 63% of students are taking mathematics; that leaves 37% in other courses.

At the 300 level, we only have 1 class ( $n = 15$ ).



**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
	c	c	Statistic	c	Statistic	c	c	Std. Error
AvgRating	538	1.00	4.00	3.2495	.67105	.450	-1.136	.105
Valid N (listwise)	538							

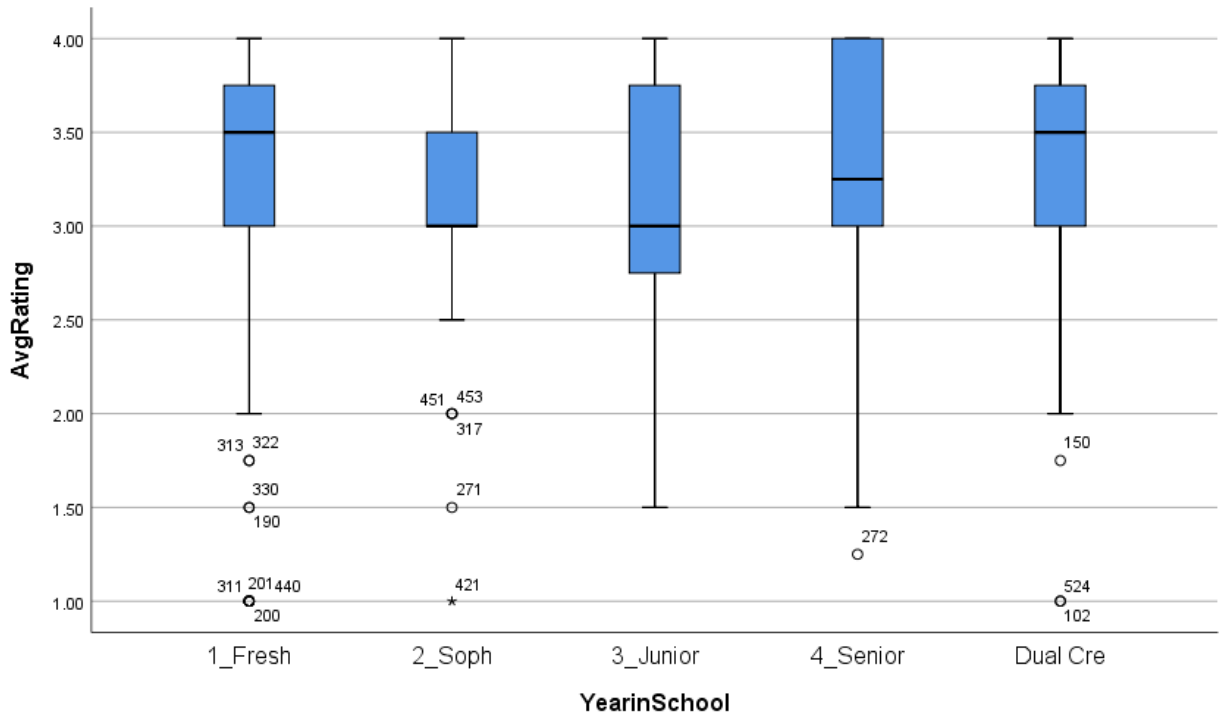
$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-1.136}{.105} = -10.819$$

Skewness is significant at  $\alpha = .05$  ( $|z| > 1.96$ )

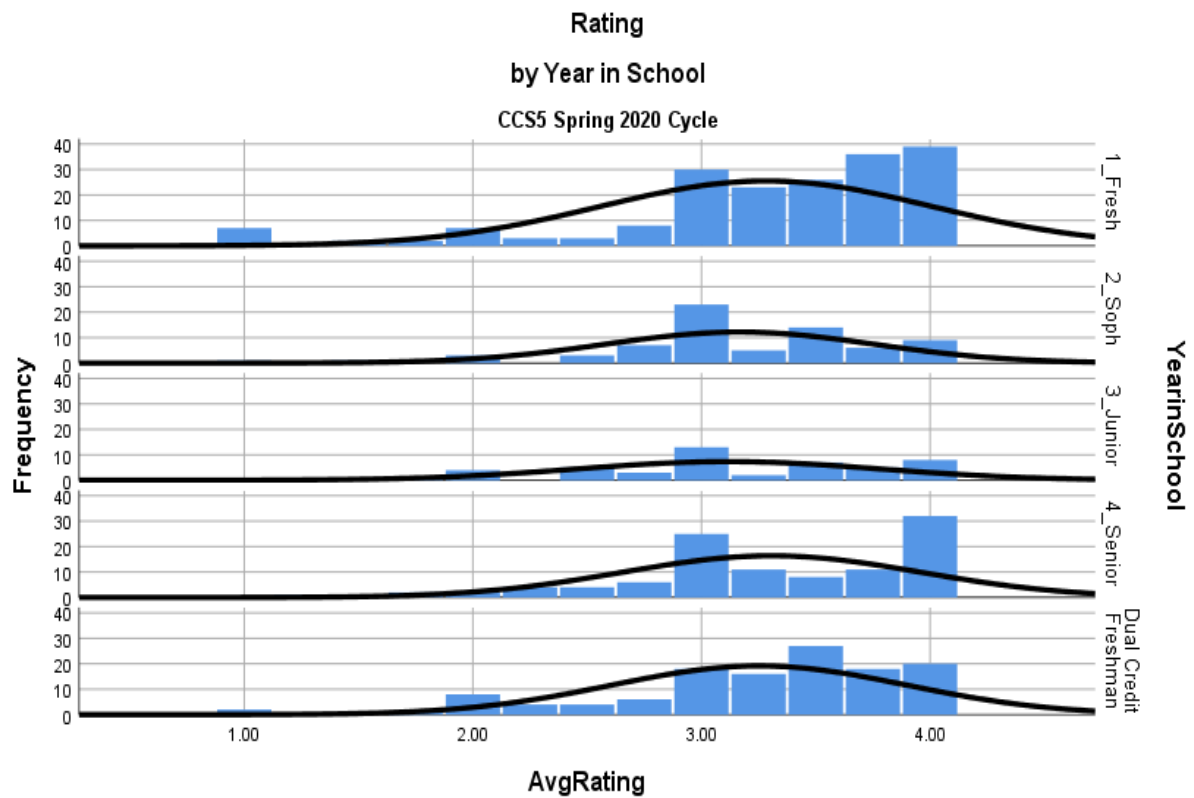
$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{1.314}{.210} = 6.257$$

Kurtosis is significant at  $\alpha = .05$  ( $|z| > 1.96$ )

Distribution is nonnormal. No floor effect; possible ceiling. No outliers.



Boxplots revealed outliers for classes: However, outliers are not extreme because they are within the range of possible scores. (Starred data is flagged as an extreme outlier by SPSS software.) Outliers were not removed.



Histograms reveal 1\_Fresh and 4\_Senior groups have the least normal distributions, with the 1\_Fresh group approaching an exponential distribution. For each class, the sampling distribution is  $n > 30$ . Nonparametric test chosen.

## Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
AvgRating	538	3.2495	.67105	1.00	4.00
School Year	538	1.91	1.207	1	4

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	310	208.07	64501.50
	4	107	211.70	22651.50
	Total	417		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	16296.500
Wilcoxon W	64501.500
Z	-.272
Asymp. Sig. (2-tailed)	.786

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 4\_Senior group distributions at  $p < .05$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	310	184.13	57079.50
	3	49	153.89	7540.50
	Total	359		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	6315.500
Wilcoxon W	7540.500
Z	-1.917
Asymp. Sig. (2-tailed)	.055

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 3\_Junior group distributions: AvgRating scores of Juniors ( $Mdn = 3.00$ ) were **lower** than AvgRating scores of Freshman ( $Mdn = 3.50$ )

$$U(N_3 = 49, N_1 = 310) = 6315.500, p = \frac{.055}{2} < .05$$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	310	197.54	61236.50
	2	72	165.51	11916.50
	Total	382		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	9288.500
Wilcoxon W	11916.500
Z	-2.243
Asymp. Sig. (2-tailed)	.025

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 2\_Soph group distributions: AvgRating scores of Sophomores (*Mdn* = 3.00) were **lower** than AvgRating scores of Freshman (*Mdn* = 3.50)  
 $U(N_2 = 72, N_1 = 310) = 9288.500, p = \frac{.025}{2} < .05$

The ANOVA omnibus test missed detecting significant findings due to the sensitivity of the mean. Planned contrasts also missed finding any significant differences:

### Descriptives

AvgRating

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	310	3.2702	.69484	.03946	3.1925	3.3478	1.00	4.00
2	72	3.1667	.58892	.06941	3.0283	3.3051	1.00	4.00
3	49	3.1173	.66556	.09508	2.9262	3.3085	1.50	4.00
4	107	3.3061	.65093	.06293	3.1813	3.4308	1.25	4.00
Total	538	3.2495	.67105	.02893	3.1927	3.3064	1.00	4.00

### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
AvgRating	Based on Mean	.790	3	534	.500
	Based on Median	.631	3	534	.595
	Based on Median and with adjusted df	.631	3	500.449	.595
	Based on trimmed mean	.730	3	534	.535

Insignificant variance at  $p < .05$

### ANOVA

AvgRating

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.825	3	.608	1.353	.256
Within Groups	239.988	534	.449		
Total	241.812	537			

**Missed** at least one significant difference in group means at  $p < .05$

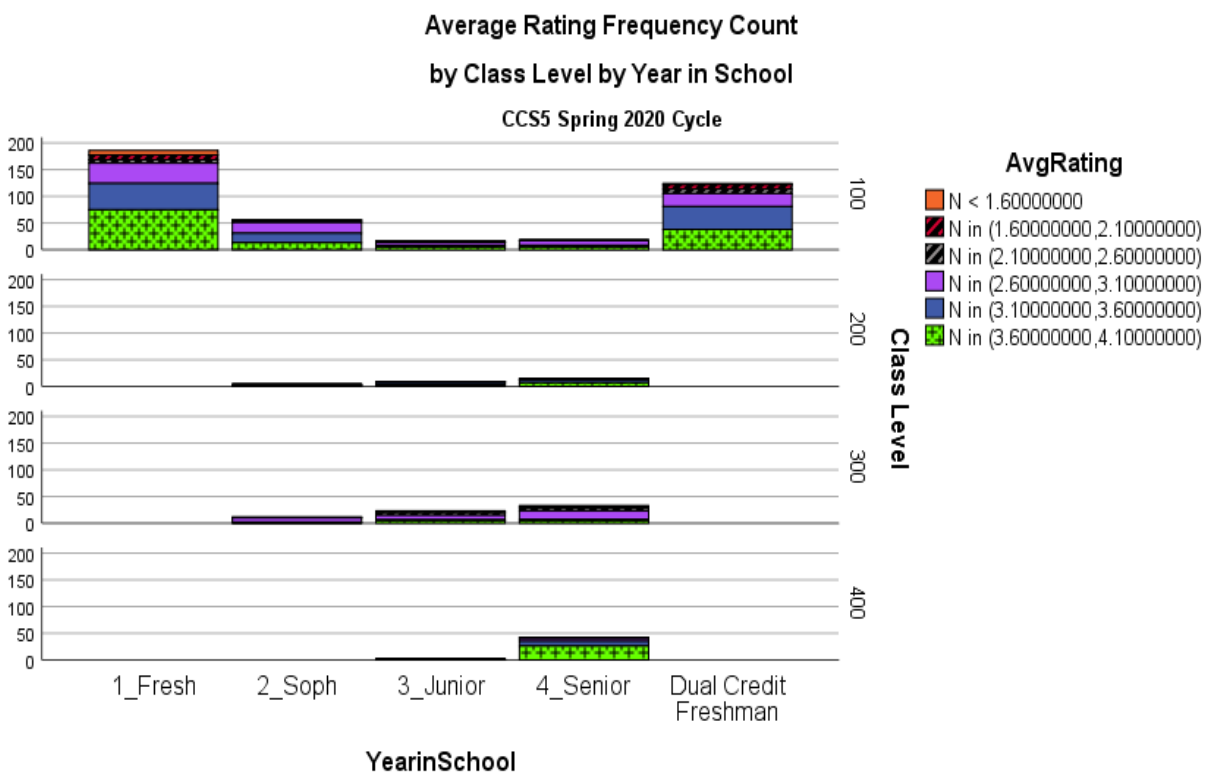
#### Contrast Coefficients

Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

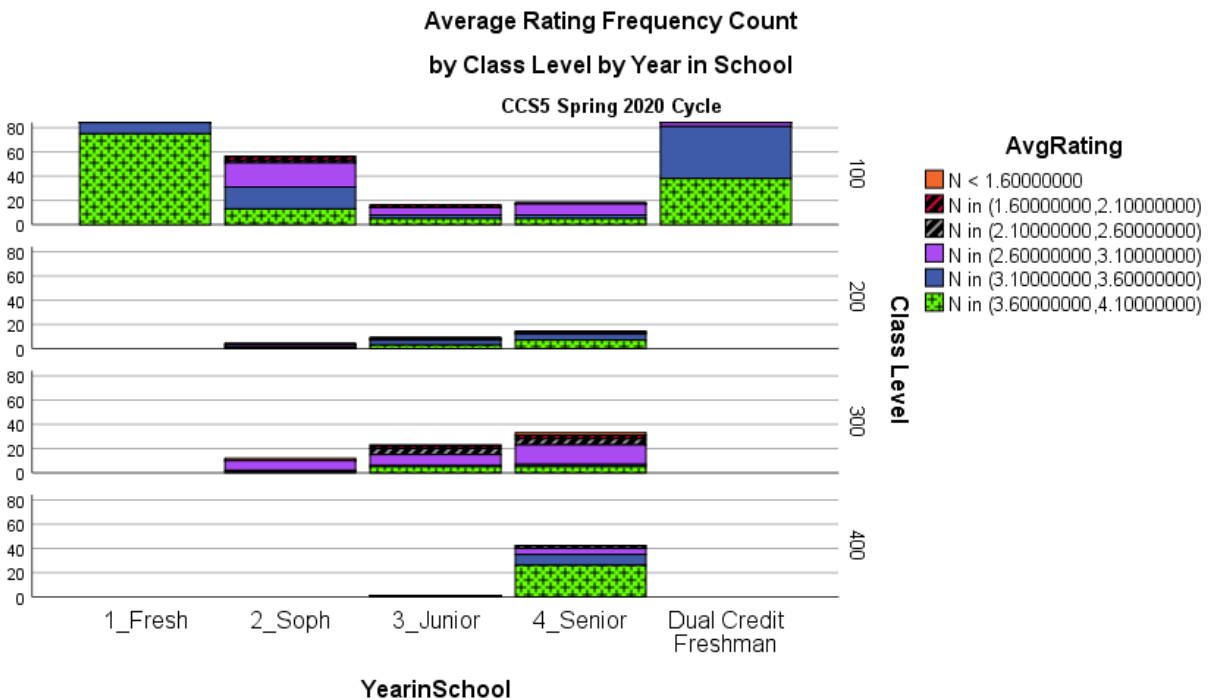
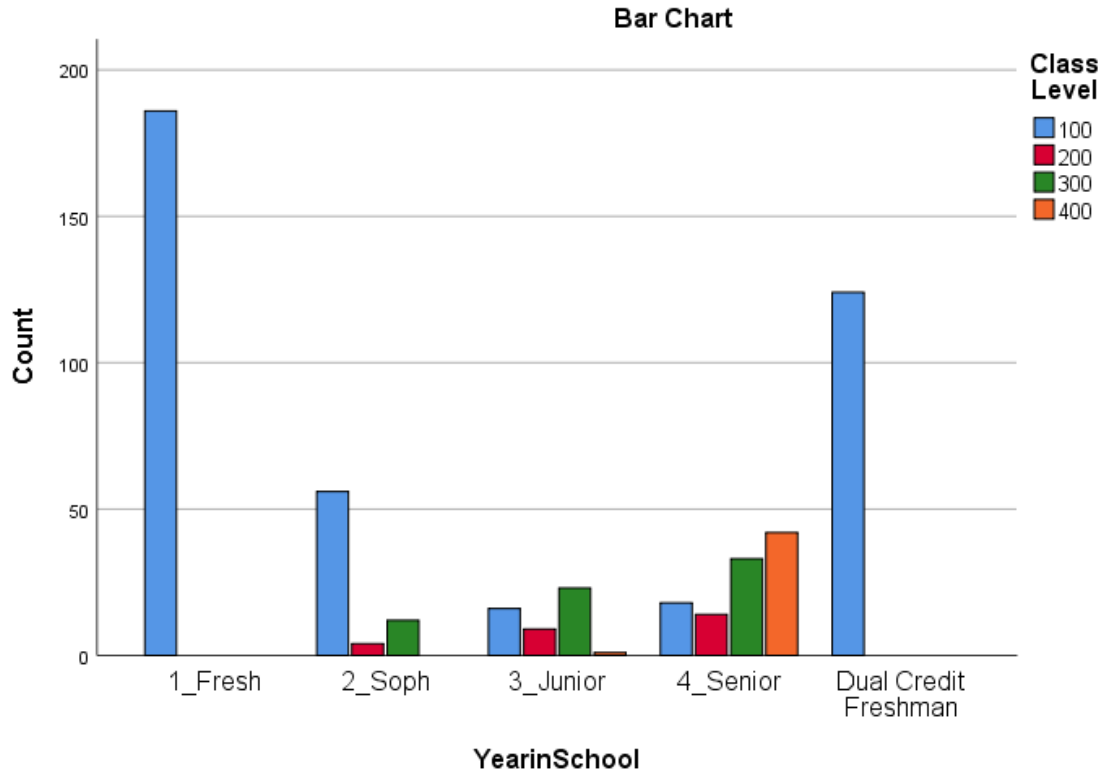
#### Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
AvgRating	Assume equal variances	1	.0359	.07517	.478	534	.633
		2	-.1528	.10306	-1.483	534	.139
		3	-.1035	.08770	-1.180	534	.238
	Does not assume equal variances	1	.0359	.07428	.483	195.407	.629
		2	-.1528	.10295	-1.484	65.660	.142
		3	-.1035	.07984	-1.296	121.416	.197

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	4:1	94%; 6% CAS; Ed&Health
200	2	1 CAS
300	1:2:1	35.3%; 33.8%; 30.9% COB; CAS; Ed&Health
400	2:2	51.2%; 48.9% CAS; Ed&Health

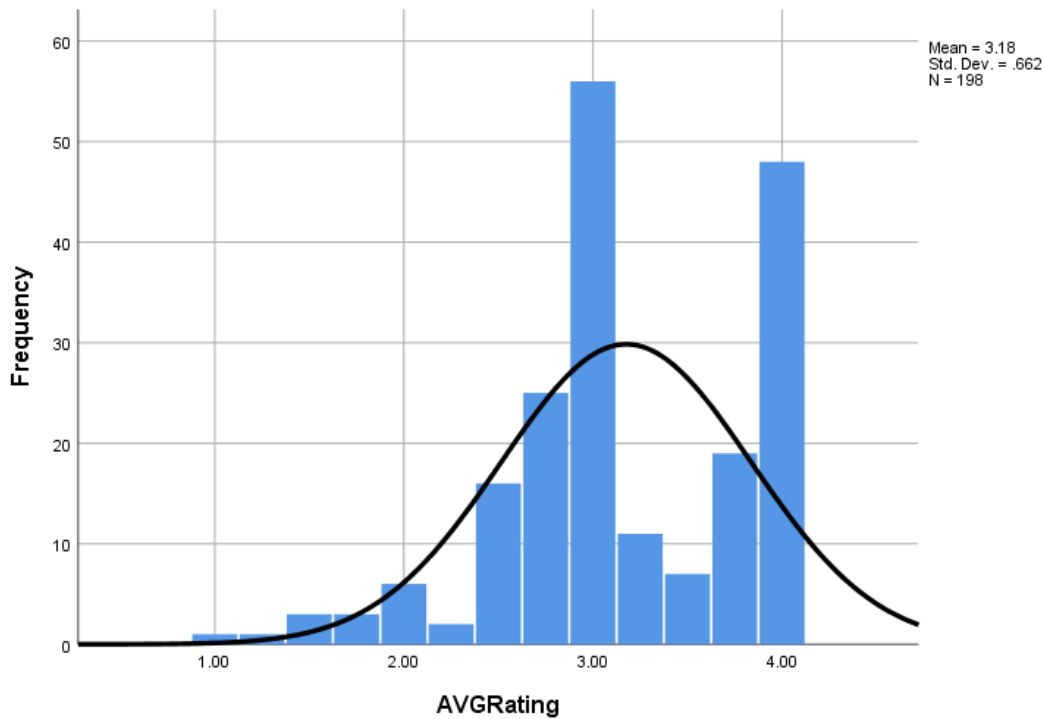


Count		Class Level				Total
		100	200	300	400	
YearinSchool	1_Fresh	186	0	0	0	186
	2_Soph	56	4	12	0	72
	3_Junior	16	9	23	1	49
	4_Senior	18	14	33	42	107
	Dual Credit Freshman	124	0	0	0	124
Total		400	27	68	43	538





In this sample, most students earn this general education credit from 100-level classes, at 74%. In this sample, 100% of Freshmen earn this credit from 100-level classes, 78% of Sophomores earn this credit from 100-level classes, 33% of Juniors earn this credit from 100-level classes, and 17% of Seniors earn this credit from 100-level classes. 39% of Seniors earn credit from 400-level classes. Freshmen rated higher than Sophomores and Juniors.



**Descriptive Statistics**

	N	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
				Statistic	Std. Error			Statistic	Std. Error	Statistic	Std. Error
AVGRating	198	1.00	4.00	3.1755	.04701	.66154	.438	-.496	.173	.059	.344
Valid N (listwise)	198										

$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-.496}{.173} = -2.867$$

Skewness is significant at  $\alpha = .05$  ( $|z| > 1.96$ )

$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{.059}{.344} = 0.1715$$

Kurtosis is not significant at  $\alpha = .05$  ( $|z| < 1.96$ )

Distribution is not dramatically different from normal. No floor or ceiling effect. No outliers.

(Warner, 2013, p. 153)

◆ CCS6 has four (4) categories. Students are rated per category with no overall rating. I am calculating an overall average rating per student (AVGRating) so that the Central Limit Theorem (CLT) applies when  $N > 30$  and because we are interested in broad trends. The CLT seems to be applicable to the data, although some dependence in the samples appears to be present. ANOVA is robust to non-normal distributions of data, and, again, I would say this distribution (above) is not extreme.

*Examples of Other Research Histograms and Judgement of Normality:*

[https://www.mdpi.com/education/education-09-00170/article\\_deploy/html/images/education-09-00170-g001.png](https://www.mdpi.com/education/education-09-00170/article_deploy/html/images/education-09-00170-g001.png)

The first two are judged as normally distributed. CSEI is judged non-normal.

\*non-normal histogram scale is 0 – 100: 0 – 70 scale shown on graph due to data

*Example of Other Research That Used Parametric Tests on Likert-Type Data:*

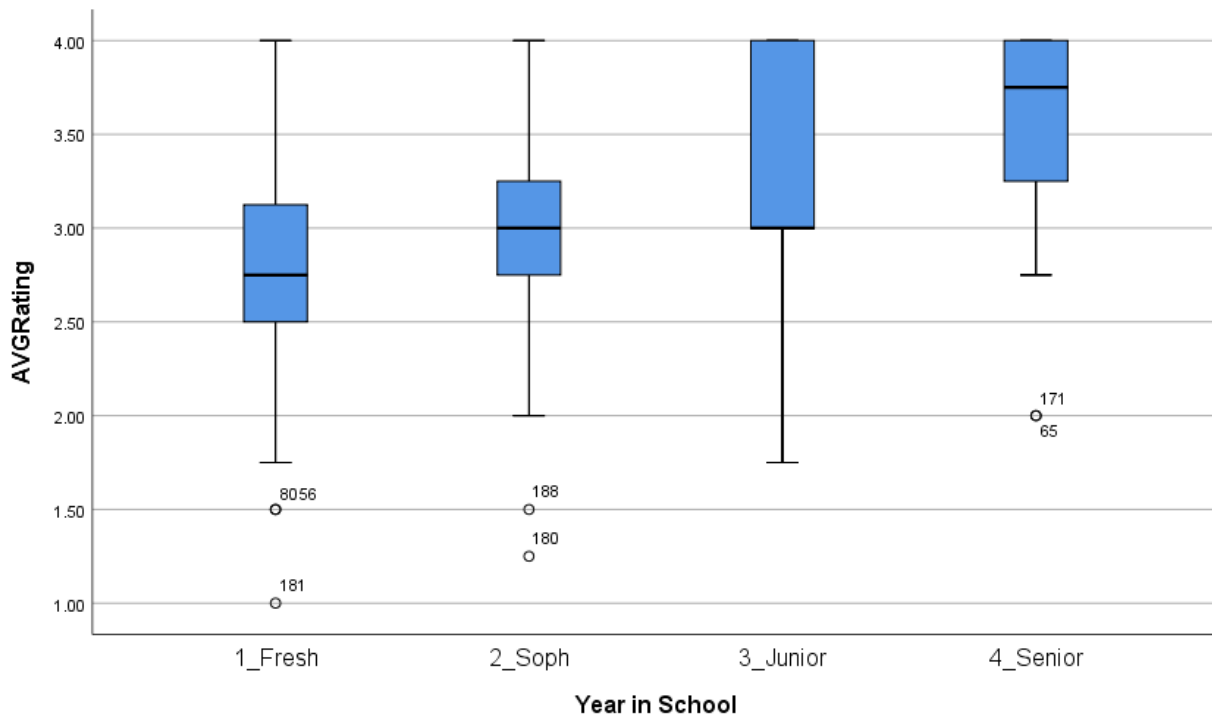
<https://www.tandfonline.com/doi/full/10.1080/0020739X.2019.1656827?src=recsys>

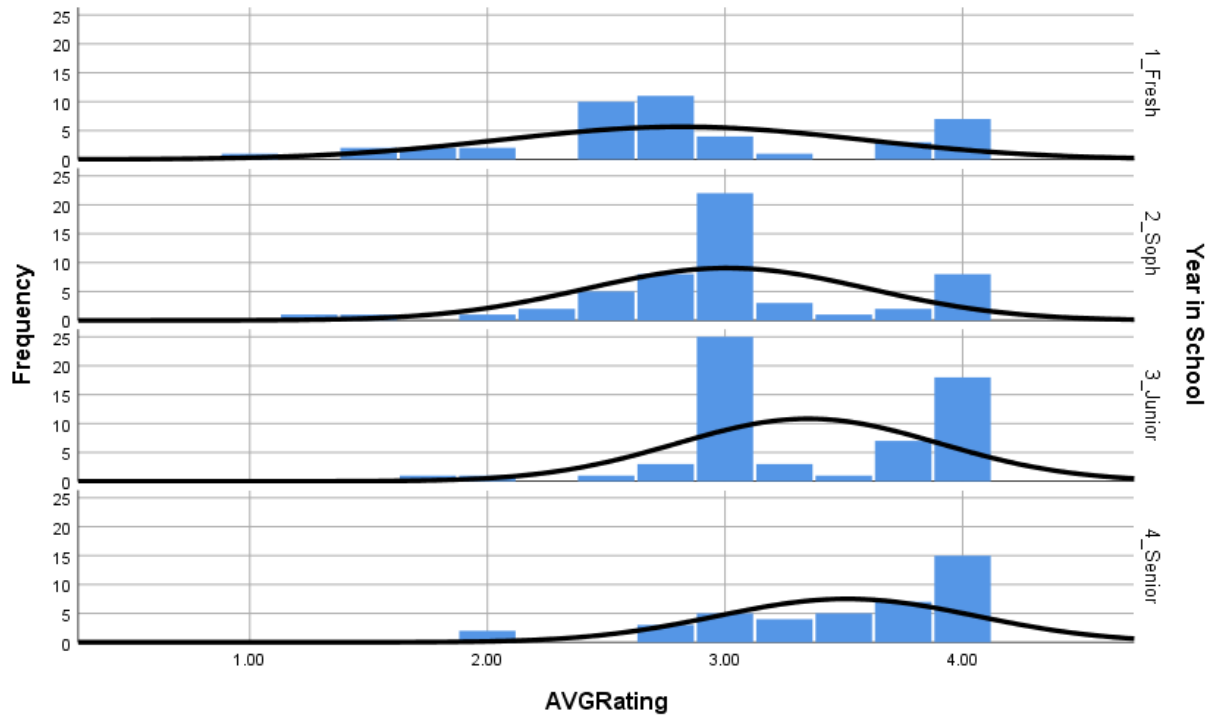
<https://rdcu.be/cc0h9>

◆ Required for ANOVA fixed factor input - Added variable SchoolYear to code YearinSchool numerically as follows:

1 = 1\_Fresh, 2 = 2\_Soph, 3 = 3\_Junior, 4 = 4\_Senior

Average Rating (AVGRating) by Year in School (YearinSchool) for boxplots and histograms were called for next to continue pre-screening. Boxplots revealed outliers for classes: However, outliers are not extreme because they are within the range of possible scores. Outliers were not removed. Histograms reveal 3\_Junior and 4\_Senior groups have the least normal distributions, with the 4\_Senior group approaching an exponential distribution. For each class, the sampling distribution is  $n > 30$ . ANOVA analysis remains appropriate, as there are no extreme outliers and distributions are not extreme from normal both in the entire sample and within each group. ANOVA results can be read with equal variance assumed or not assumed, so Levene’s test of homogeneity was called for. (Boxplots and histograms sorted alphabetically, listing Junior prior to Senior, prior to Sophomore. After the ANOVA, I ran boxplots and histograms again to sort according to class rank by recoding Freshman to 1\_Fresh, Sophomore to 2\_Soph, Junior to 3\_Junior, and Senior to 4\_Senior.)





Planned contrasts for the ANOVA (Warner, 2013, pp. 240 – 243):

1. Freshman to Senior
2. Freshman to Junior
3. Freshman to Sophomore

-1	0	0	1
-1	0	1	0
-1	1	0	0

$$H_a: \bar{X}_F < \bar{X}_{Sr}, \alpha = .05$$

$$H_a: \bar{X}_F < \bar{X}_J$$

$$H_a: \bar{X}_F < \bar{X}_{So}$$

		School Year			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	43	21.7	21.7	21.7
	2	54	27.3	27.3	49.0
	3	60	30.3	30.3	79.3
	4	41	20.7	20.7	100.0
Total		198	100.0	100.0	

SPSS adjusts unequal ns automatically (unequal frequencies)

**Descriptives**

AVGRating								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	43	2.8198	.75853	.11568	2.5863	3.0532	1.00	4.00
2	54	3.0093	.59472	.08093	2.8469	3.1716	1.25	4.00
3	60	3.3500	.55273	.07136	3.2072	3.4928	1.75	4.00
4	41	3.5122	.54472	.08507	3.3403	3.6841	2.00	4.00
Total	198	3.1755	.66154	.04701	3.0828	3.2682	1.00	4.00

**Test of Homogeneity of Variances**

		Levene Statistic	df1	df2	Sig.
AVGRating	Based on Mean	1.795	3	194	.150
	Based on Median	1.019	3	194	.385
	Based on Median and with adjusted df	1.019	3	189.005	.385
	Based on trimmed mean	1.783	3	194	.152

No significant variance at  $p < .05$

**ANOVA**

AVGRating					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.409	3	4.470	11.910	.000
Within Groups	72.805	194	.375		
Total	86.214	197			

At least one significant difference in group means at  $p < .05$

$$F(3, 194) = 11.910, p < .001$$

$$\eta^2 = \frac{SS_{between}}{SS_{total}} = \frac{13.409}{86.214} = .16$$

About 16% of the variance in average rating is predicted from school year.

**Contrast Coefficients**

Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

**Contrast Tests**

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
AVGRating	Assume equal variances	1	.6924	.13372	5.178	194	.000
		2	.5302	.12240	4.332	194	.000
		3	.1895	.12521	1.513	194	.132
	Does not assume equal variances	1	.6924	.14359	4.822	76.287	.000
		2	.5302	.13591	3.901	72.566	.000
		3	.1895	.14118	1.342	78.311	.183

Remaining Results:

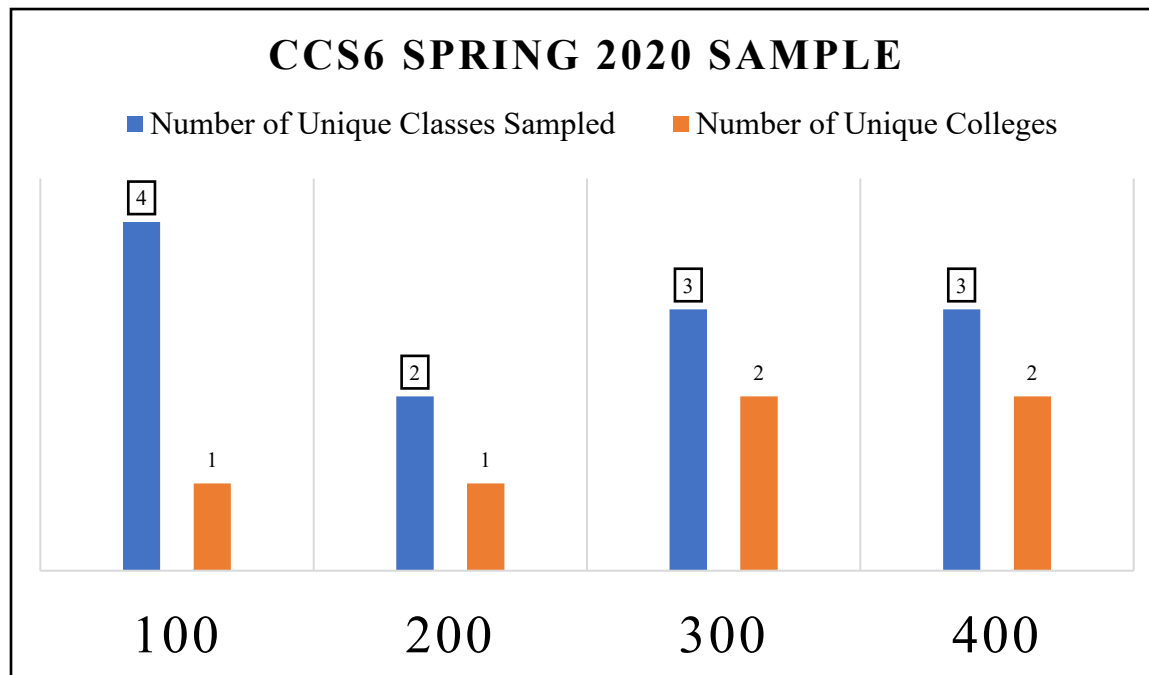
Planned contrast 1 (comparing the mean of Group 1, Freshman, to the mean of Group 4, Senior) is significant:  $t(194) = 5.178, p < .001$ . The mean average CCS 6 rating for Freshman ( $M = 2.82$ ) is significantly lower than the mean average CCS 6 rating for Senior ( $M = 3.51$ ).

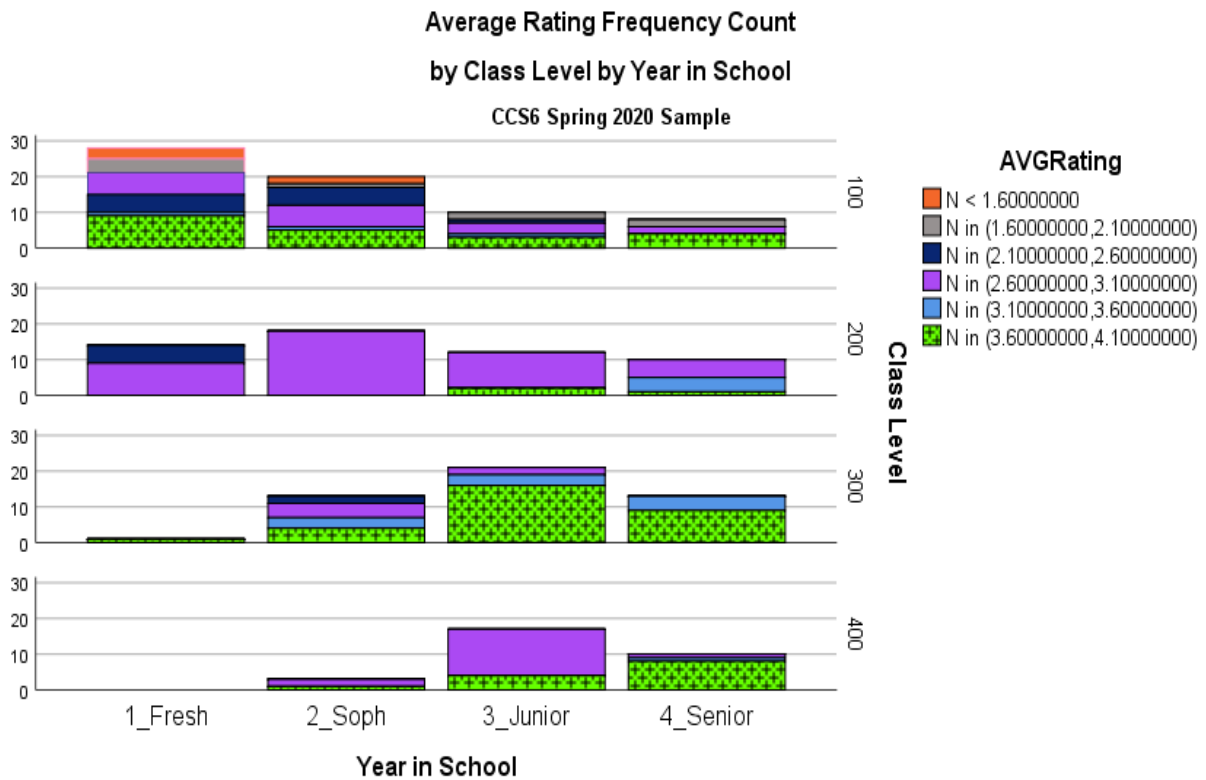
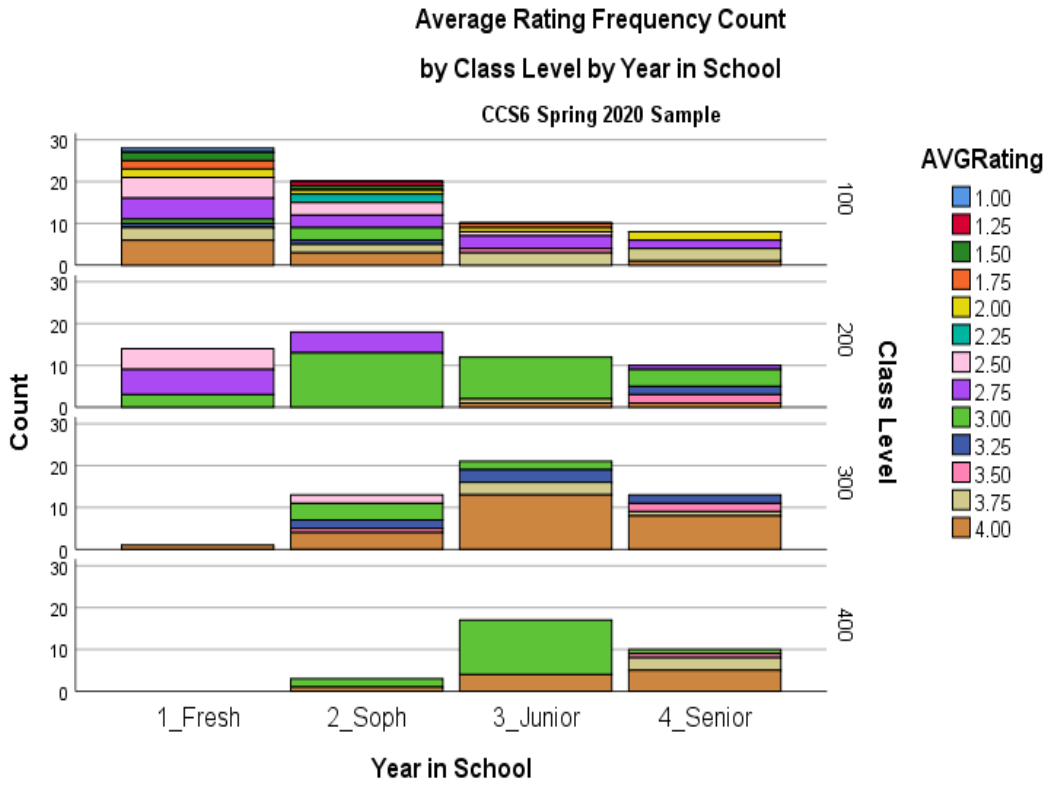
Planned contrast 2 (comparing the mean of Group 1, Freshman, to the mean of Group 3, Junior) is significant:  $t(194) = 4.332, p < .001$ . The mean average CCS 6 rating for Freshman ( $M = 2.82$ ) is significantly lower than the mean average CCS 6 rating for Junior ( $M = 3.35$ ).

Planned contrast 3 (comparing the mean of Group 1, Freshman, to the mean of Group 2, Sophomore) is insignificant at  $p < .05$ . The mean average CCS 6 rating for Freshman ( $M = 2.82$ ) is *\*not\** significantly lower than the mean average CCS 6 rating for Sophomore ( $M = 3.01$ ).

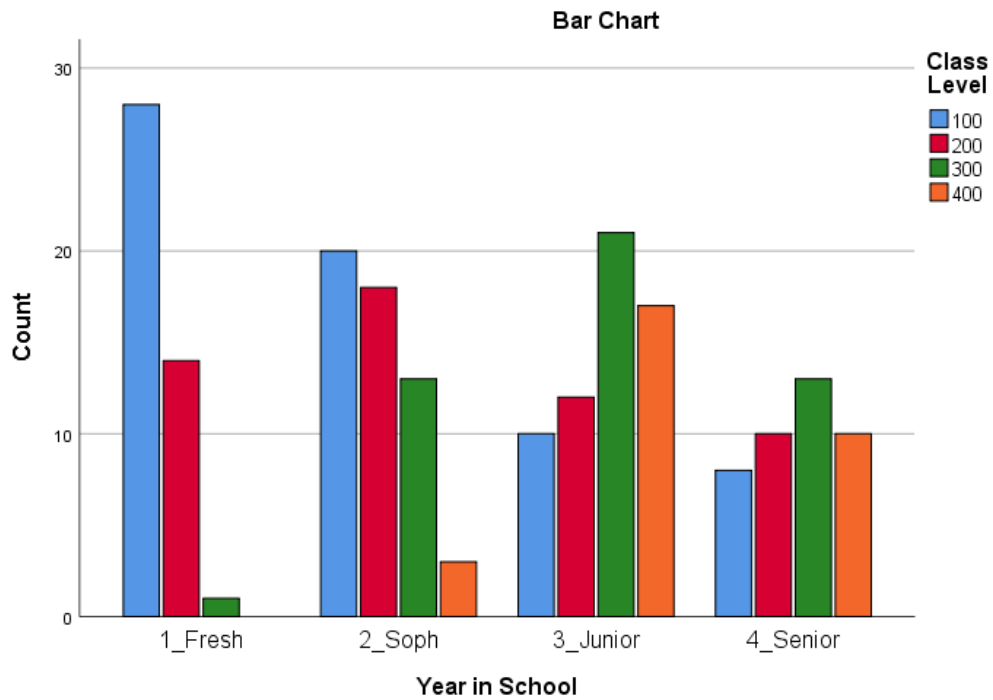
Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	4	1
200	2	1
300	3 = 2:1	1st = 83.3%, 2nd = 16.7% (COB, Ed&Health)
400	3 = 1:2	1st = 50%, 2nd = 50% (CAS, Ed&Health)

Overall, each college is represented in the sample.





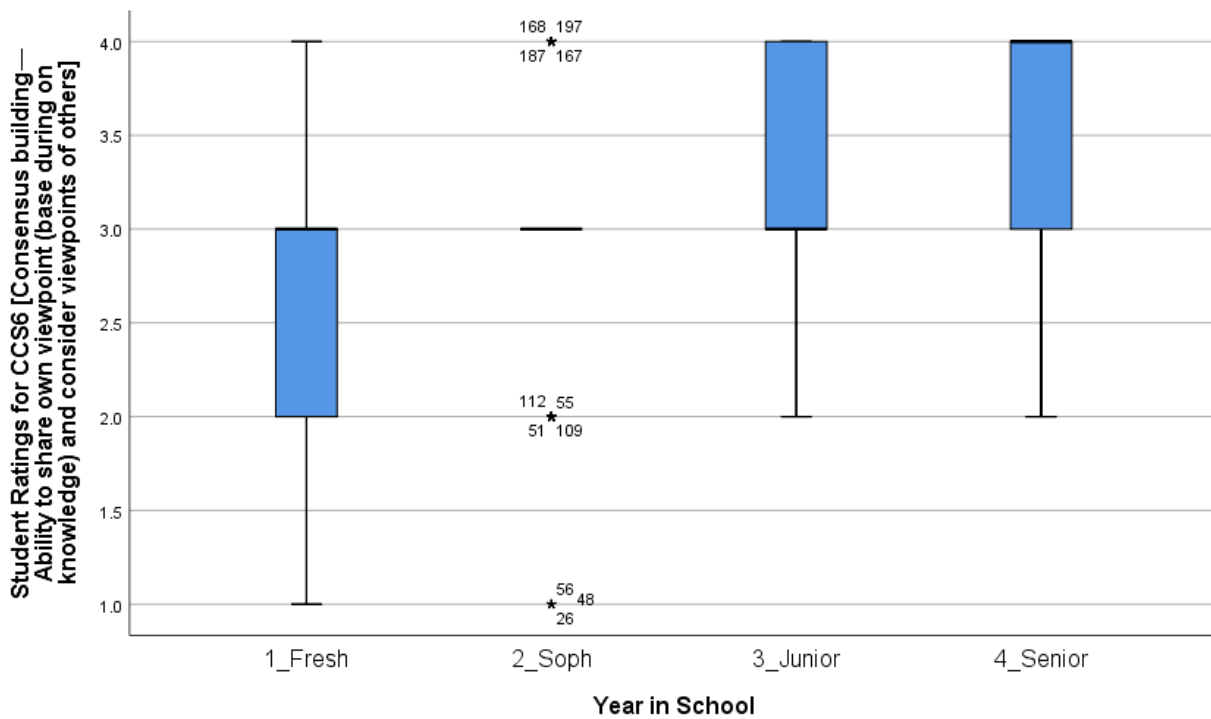
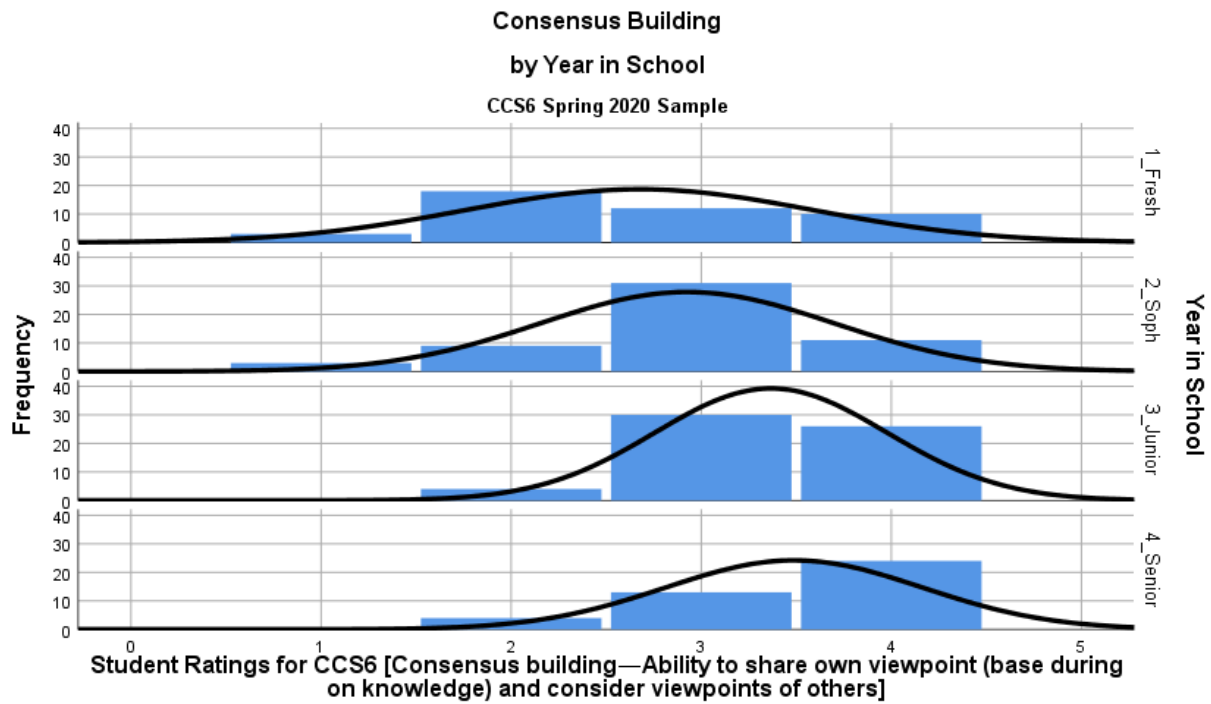




**Year in School \* Class Level Crosstabulation**

Count		Class Level				Total
		100	200	300	400	
Year in School	1_Fresh	28	14	1	0	43
	2_Soph	20	18	13	3	54
	3_Junior	10	12	21	17	60
	4_Senior	8	10	13	10	41
Total		66	54	48	30	198

### Subcategories



**Test of Homogeneity of Variances**

		Levene Statistic	df1	df2	Sig.
Student Ratings for CCS6	Based on Mean	4.322	3	194	.006
[Consensus building—Ability	Based on Median	2.879	3	194	.037
to share own viewpoint (base	Based on Median and with	2.879	3	185.328	.037
during on knowledge) and	adjusted df				
consider viewpoints of	Based on trimmed mean	4.512	3	194	.004
others]					

significant variance at  $p < .05$

**ANOVA**

Student Ratings for CCS6 [Consensus building—Ability to share own viewpoint (base during on knowledge) and consider viewpoints of others]

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.768	3	6.589	11.911	.000
Within Groups	107.323	194	.553		
Total	127.091	197			

At least one significant difference in group means at  $p < .05$

$$F(3, 194) = 11.911, p < .001$$

$$\eta^2 = \frac{SS_{between}}{SS_{total}} = \frac{19.768}{127.091} = .16$$

About 16% of the variance in Consensus Building is predicted from school year.

**Student Ratings for CCS6 [Consensus building—Ability to share own viewpoint (base during on knowledge) and consider viewpoints of others] \*  
Year in School Crosstabulation**

Count

		Year in School				Total
		1_Fresh	2_Soph	3_Junior	4_Senior	
Student Ratings for CCS6	1	3	3	0	0	6
[Consensus building—Ability	2	18	9	4	4	35
to share own viewpoint	3	12	31	30	13	86
(base during on knowledge)	4	10	11	26	24	71
and consider viewpoints of						
others]						
Total		43	54	60	41	198

1\_Fresh mean:  $(3*1+18*2+12*3+10*4)/43 = 115/43 = 2.67$

2\_Soph mean:  $(3*1+9*2+31*3+11*4)/54 = 158/54 = 2.93$

3\_Junior mean:  $(0*1+4*2+30*3+26*4)/60 = 202/60 = 3.37$

4\_Senior mean:  $(0*1+4*2+13*3+24*4)/41 = 143/41 = 3.49$

### Contrast Coefficients

Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

### Contrast Tests

		Contrast	Value of	Std.	t	df	Sig. (2-tailed)
			Contrast	Error			
Student Ratings for CCS6 [Consensus building—Ability to share own viewpoint (base during on knowledge) and consider viewpoints of others]	Assume equal variances	1	.81	.162	5.010	194	.000
		2	.69	.149	4.658	194	.000
		3	.25	.152	1.654	194	.100
	Does not assume equal variances	1	.81	.175	4.639	77.099	.000
		2	.69	.161	4.308	67.890	.000
		3	.25	.175	1.435	82.074	.155

Remaining Results follow overall average results:

Planned contrast 1 (comparing the mean of Group 1, Freshman, to the mean of Group 4, Senior) is significant:  $t(77) = 4.639, p < .001$ . The mean Consensus Building CCS 6 rating for Freshman ( $M = 2.67$ ) is significantly lower than the mean Consensus Building CCS 6 rating for Senior ( $M = 3.49$ ).

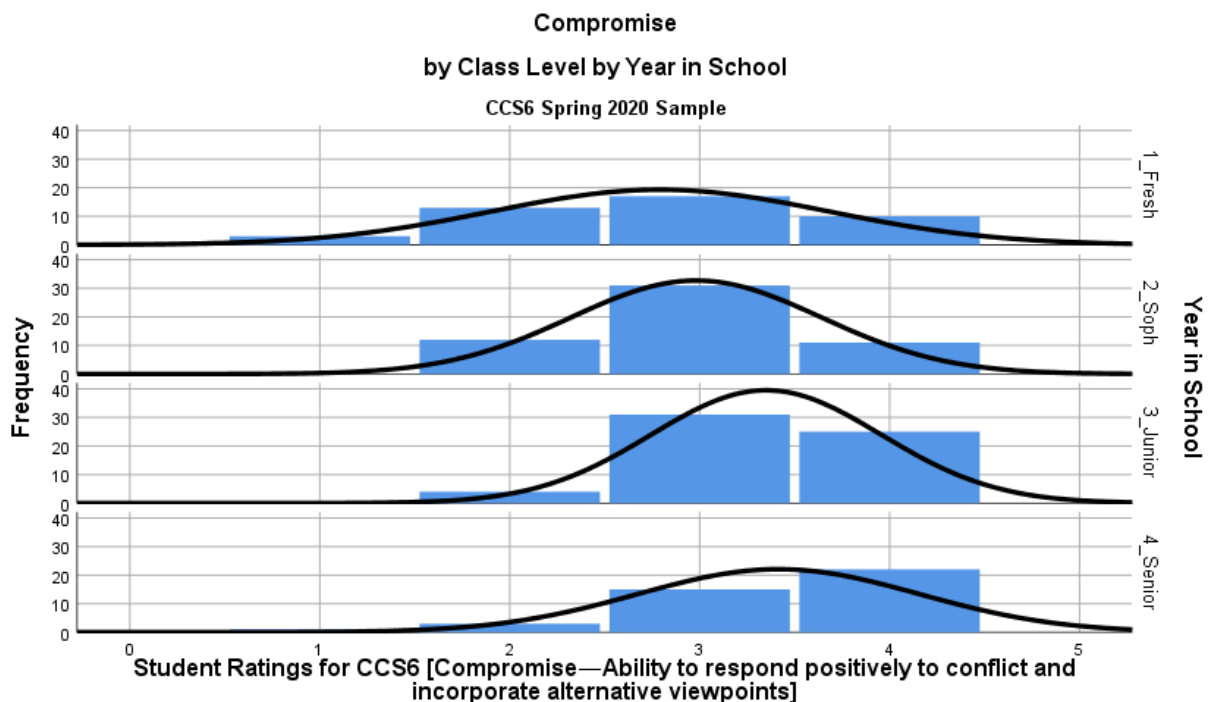
Planned contrast 2 (comparing the mean of Group 1, Freshman, to the mean of Group 3, Junior) is significant:  $t(68) = 4.308, p < .001$ . The mean Consensus Building CCS 6 rating for Freshman ( $M = 2.67$ ) is significantly lower than the mean Consensus Building CCS 6 rating for Junior ( $M = 3.37$ ).

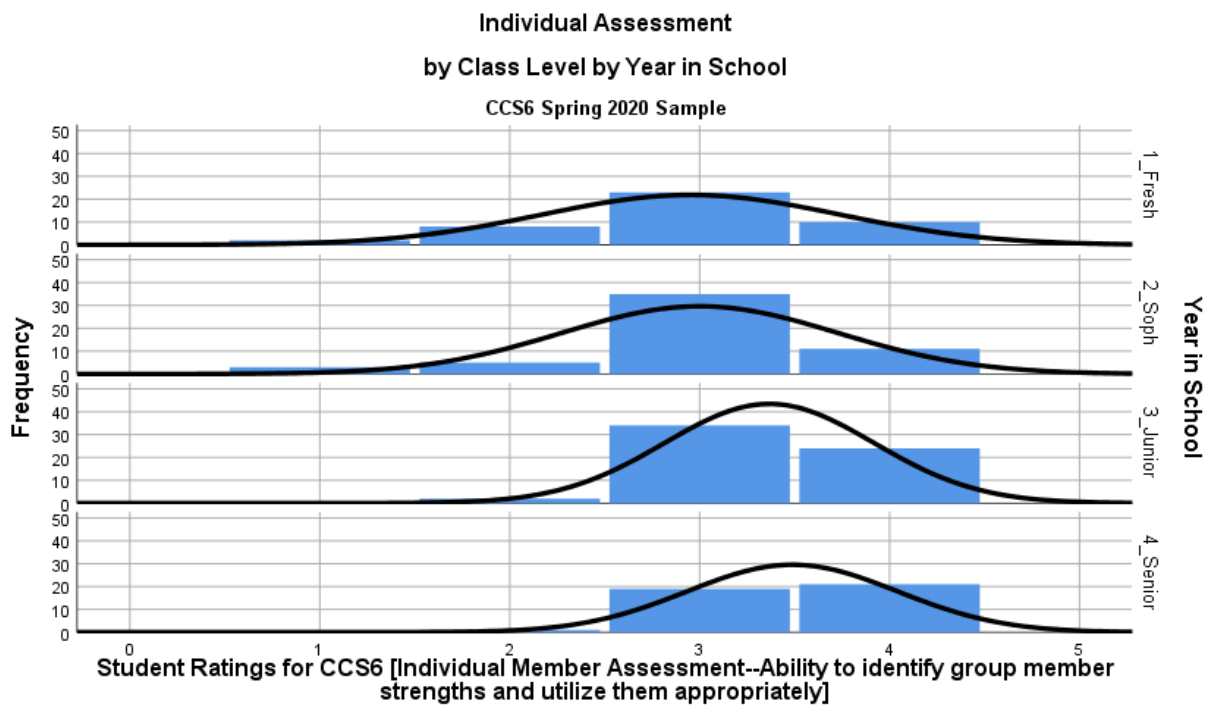
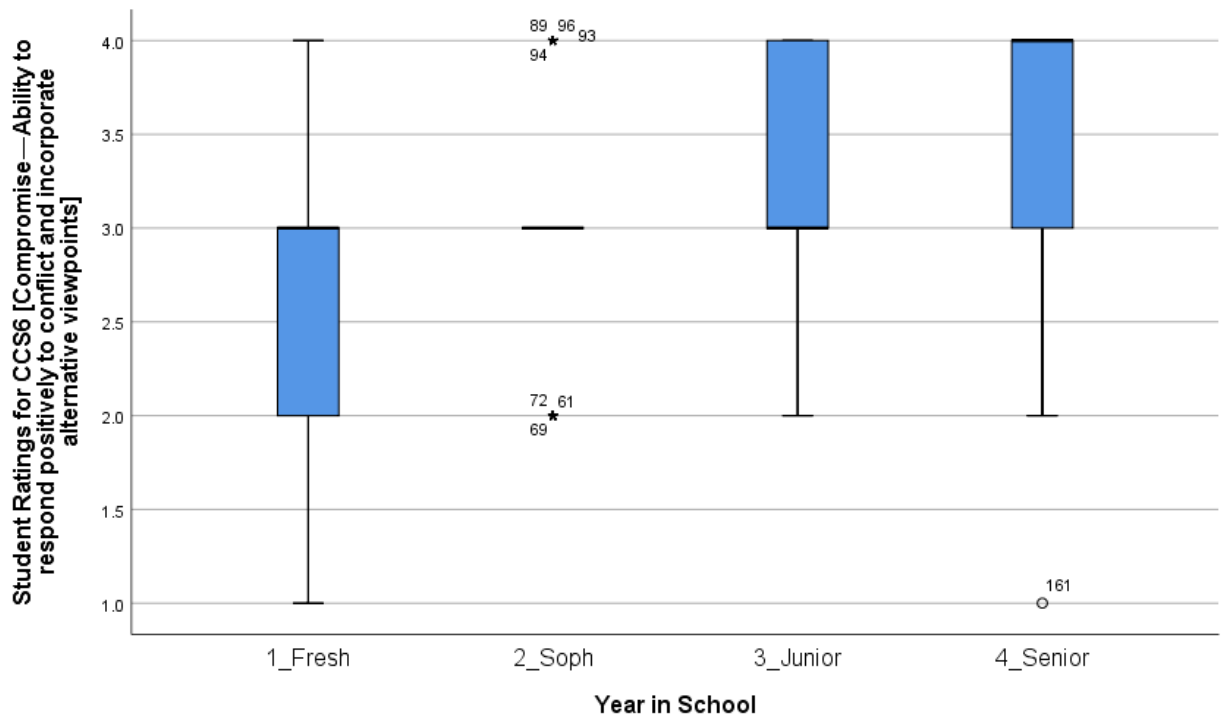
Planned contrast 3 (comparing the mean of Group 1, Freshman, to the mean of Group 2, Sophomore) is insignificant at  $p < .05$ . The mean Consensus Building CCS 6 rating for Freshman ( $M = 2.67$ ) is \*not\* significantly lower than the mean Consensus Building CCS 6 rating for Sophomore ( $M = 2.93$ ).

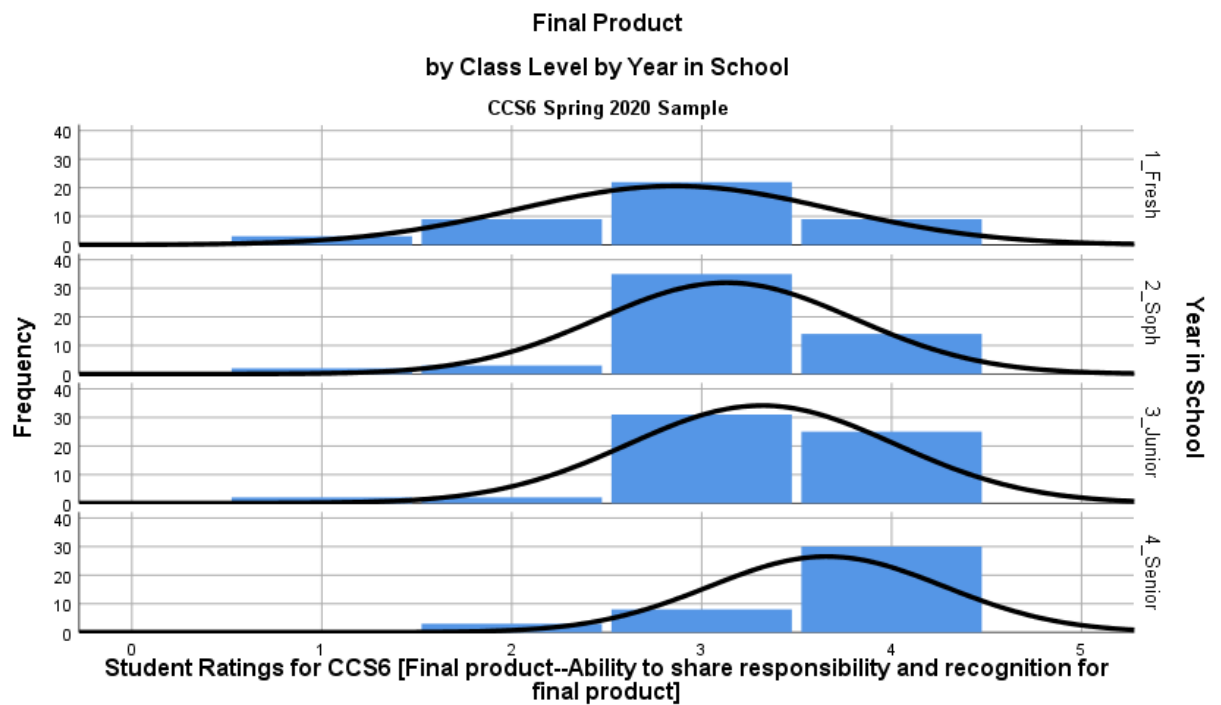
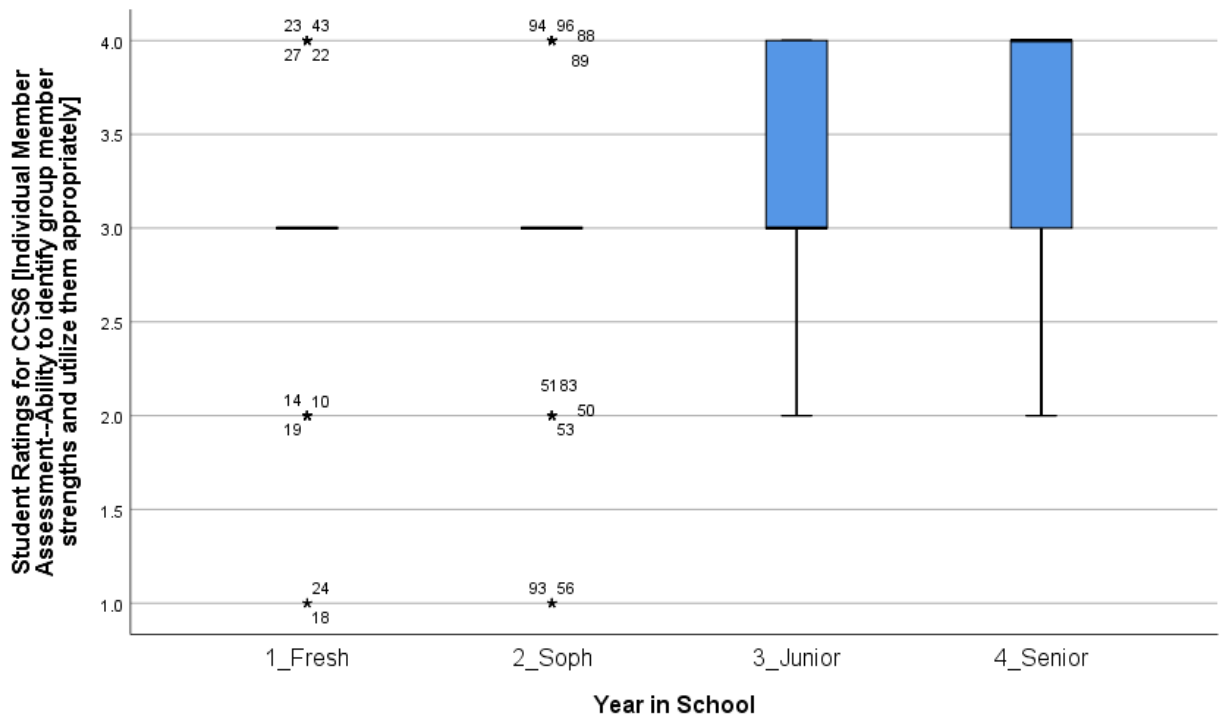
To summarize, unless the *ns* in the groups are small and/or extremely unequal, violations of the assumption that scores are drawn from normally distributed populations with equal variances probably do not cause serious problems with risk of Type I error in the independent samples *t* test. If data are extremely nonnormally distributed and/or the populations have extremely different variances and if there are also small *ns* and/or unequal *ns* for the samples, it may be advisable to do one of the following. The equal variances not assumed version of the *t* test may be reported. . . . Scores can be converted to ranks, and a nonparametric test such as the Wilcoxon rank sum test may be performed instead. (Warner, 2013, p. 192)

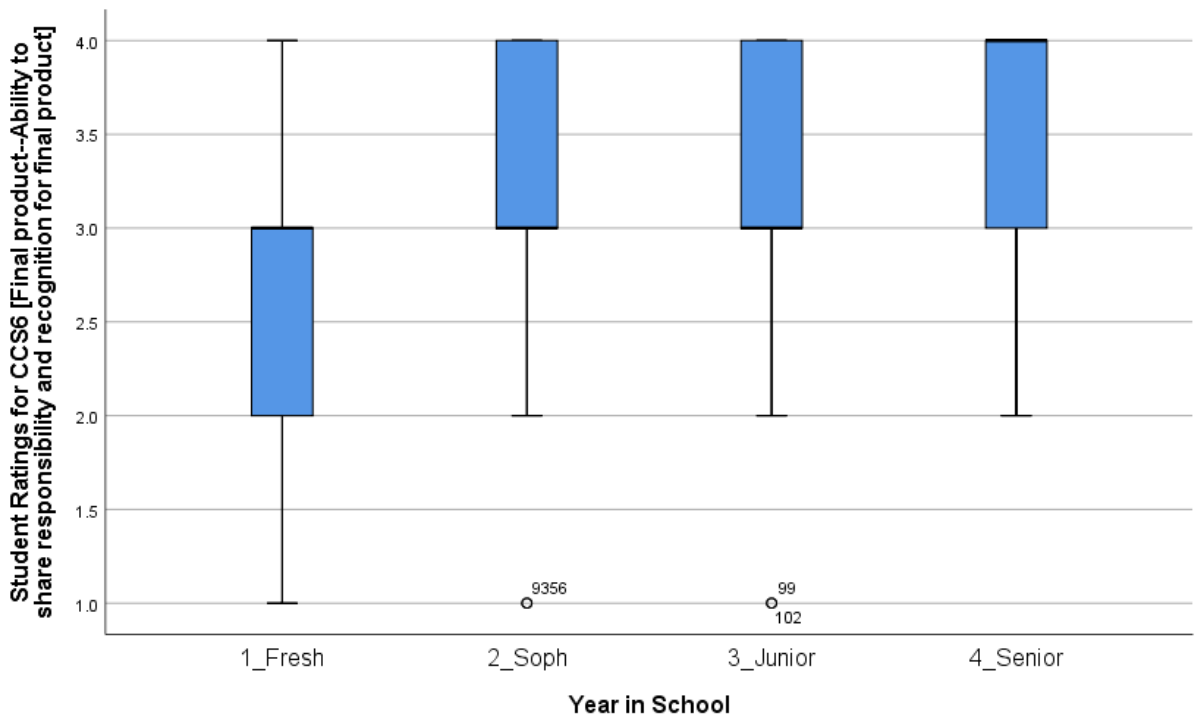
What we're worried about with Type I error is rejecting the null when we should not have. In other words, we are worried about saying the sample we drew is *not* likely to occur by chance when it *is* likely to occur by chance.

Applying the above guidelines to subcategories, Rank-Sum requires samples to be independent and random. Each course would be considered independent, sorted by school year. Multiple sections of the same course are blended together when they occur in a semester, which blends independent samples together for a larger independent sample. For subcategories, the mean of the means is *not* being analyzed: Individual scores or single group means are being analyzed. Running nonparametric tests requires less pre-screening.











## Parametric vs. Nonparametric Analysis:

"Can researchers legitimately compute statistics (such as mean,  $t$  test, and correlation) for scores such as 5-point rating when the differences between these scores may not represent exactly equal amounts of change . . . ? Many researchers implicitly assume that the answer to this question is yes" (p. 7). The shape of the distribution is a more important than ordinal or interval (last para, p. 8).

"Jaccard and Becker (2002) pointed out that there is disagreement among behavioral scientists about when to use parametric versus nonparametric analyses. . . . Bohrnstedt and Carter (1971) . . . argued that many parametric techniques are fairly robust<sup>6</sup> to violations of assumptions and concluded that even for variables measured at an ordinal level, 'parametric analyses not only can be, but should be, applied'" (p. 23). "When only one or two of the requirements for a parametric statistic are violated, or if the violations are not severe (e.g., the distribution shape for scores on the outcome variable is only slightly different from normal), then it may still be reasonable to use a parametric statistic. When in doubt about whether to choose parametric or nonparametric statistics, many researchers lean toward choosing parametric statistics" (p. 23).

- a. More familiar
- b. Thought to have better statistical power
- c. Ability to work with multiple variables
  - i. (p.23)

"When violations of the assumptions for the use of parametric statistics are severe, it is more appropriate to use nonparametric analyses. Violations of assumptions . . . become much more problematic when they are accompanied by small (and particularly small and unequal) group sizes" (p. 23).

"Parametric and nonparametric statistics each have strengths and limitations" (p. 25). This is a more useful approach than right or wrong (p.25).

Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques* (2nd Ed.). Sage.

## General Education: Assessment Goals

“Over time, the assessment committee will collect substantial amounts of data indicating student performance on the learning outcomes of each of the 11 areas, allowing regular cycles of analysis, campus discussion, and improvement. This system is designed to let MSU faculty see broad trends in the effectiveness of our general education model and to adjust for improvement” (see [Assessment](#)).

### What are we looking to answer?

*What is effectiveness?* The hope is to make this clear from analysis.

- Analysis is construed as a snapshot of the effectiveness of the Gen Ed **program**.
- Data is collected every third semester from each development content area.

*What is improvement?* Closing achievement gaps

Towards campus discussion, we invited Laurie Geller and three other faculty to review analysis for one of the areas: Laurie had some feedback for us.

### Recent Past Data Analyses--Reverse Timeline:

- Added data to categories except CCS 3, CCS 6, and PSR 3, which will be reassessed Spring 2020
- Data reported as Chi Square ( $\chi^2$ ): categorical
  - Assumption: Each student will *\*not\** be exposed to CCS, PSR, and IP content multiple times throughout their career.
- Data reported as means  $\pm$  SD with analyses of differences between classes (i.e., Freshman vs. Seniors)
  - Assumption: Each student will be exposed to CCS, PSR, and IP content multiple times throughout their career.
  - Consistent results between reports.

## General Education: Hypotheses

Carried Forward - Null Hypothesis: The intervention/class did not change Freshmen, Sophomore, Junior and Senior ability to determine the nature and extent of the information needed because the intervention/class was ineffective.

- Restatement -  $H_0: \bar{X}_i = \bar{X}_i$  Unable to test because no paired measure exists.

Carried Forward - Null Hypothesis: The intervention/class did not change Freshmen, Sophomore, Junior and Senior ability to determine the nature and extent of the information needed relative to peers.

- Restatement -  $H_0: \bar{X}_F = \bar{X}_{So} = \bar{X}_J = \bar{X}_{Sr}; H_a: \bar{X}_F < \bar{X}_{So}; \bar{X}_F < \bar{X}_J; \bar{X}_F < \bar{X}_{Sr}, \alpha = .05$ 
  - Because the population is not well defined, it is most likely that freshman will be exposed once to content, and other classes will be exposed two (2) or more times. Data will still be confounded.

Carried Forward - Null Hypothesis: The distribution of scores between Freshmen and Seniors did not differ significantly ( $\alpha=0.05, b=0.2$ ) because the course instruction had little to no impact on the students' learning outcomes relative to each other.

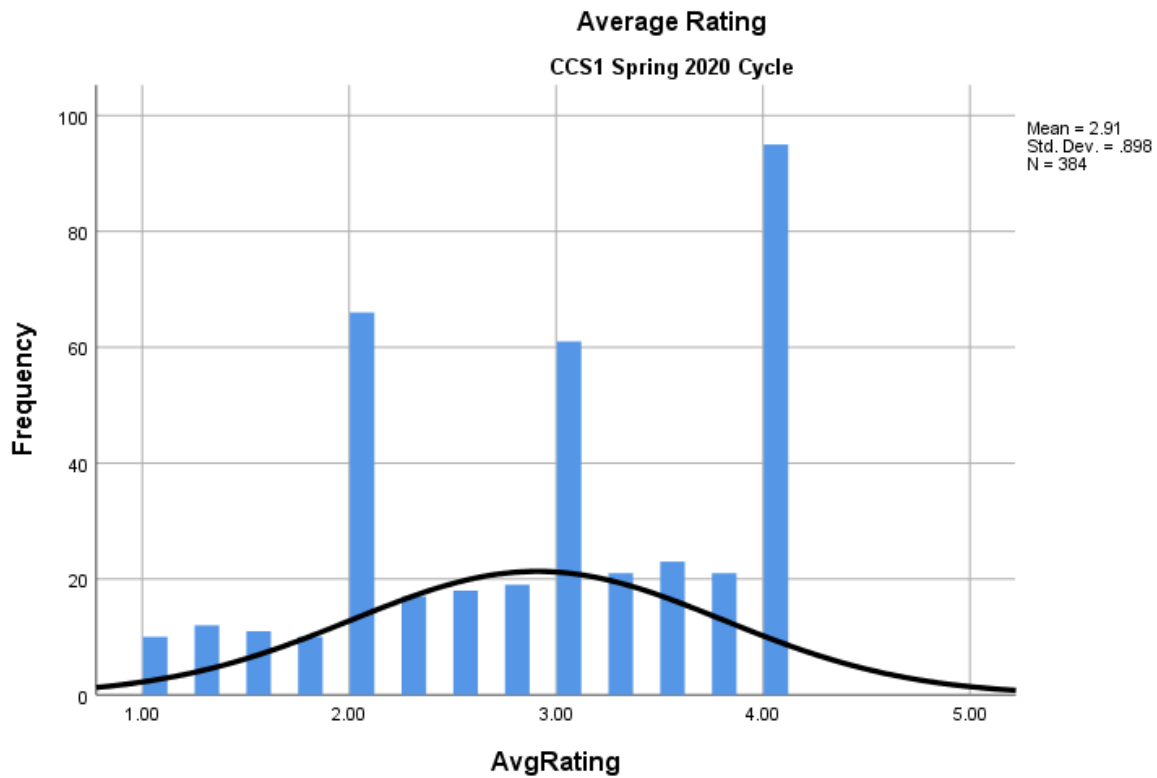
- Restatement -  $H_0: \bar{X}_F = \bar{X}_{Sr}; H_a: \bar{X}_F < \bar{X}_{Sr}, \alpha = .05$ ; Statements captured above.

## General Education: Current Data Analyses

- Current Assumption: Most students receive a mixture of exposure to CCS, PSR, and IP content with a minimum of two (2) courses in most.
  - IP2 likely to be a single course
  - <http://catalog.minotstateu.edu/undergraduate/degreerequirements/newgeneraleducationrequirements/>
  - <https://www.minotstateu.edu/mathcs/programs.shtml>
  - Agree – Student population can be grouped into two (2) categories: those experiencing content once and those experiencing content two (2) or more times.
  - Agree - This confounds analyses based upon class status (i.e., Freshman vs. Seniors)

Towards campus discussion, we invited Laurie Geller and three other faculty to review analysis for one of the areas: Laurie had some feedback for us.

[Every Learner Everywhere Learning Analytics Use Case Table](#)



### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic		
							Std. Error	Std. Error		
AvgRating	384	1.00	4.00	2.9091	.89839	.807	-.308	.125	-1.061	.248
Valid N (listwise)	384									

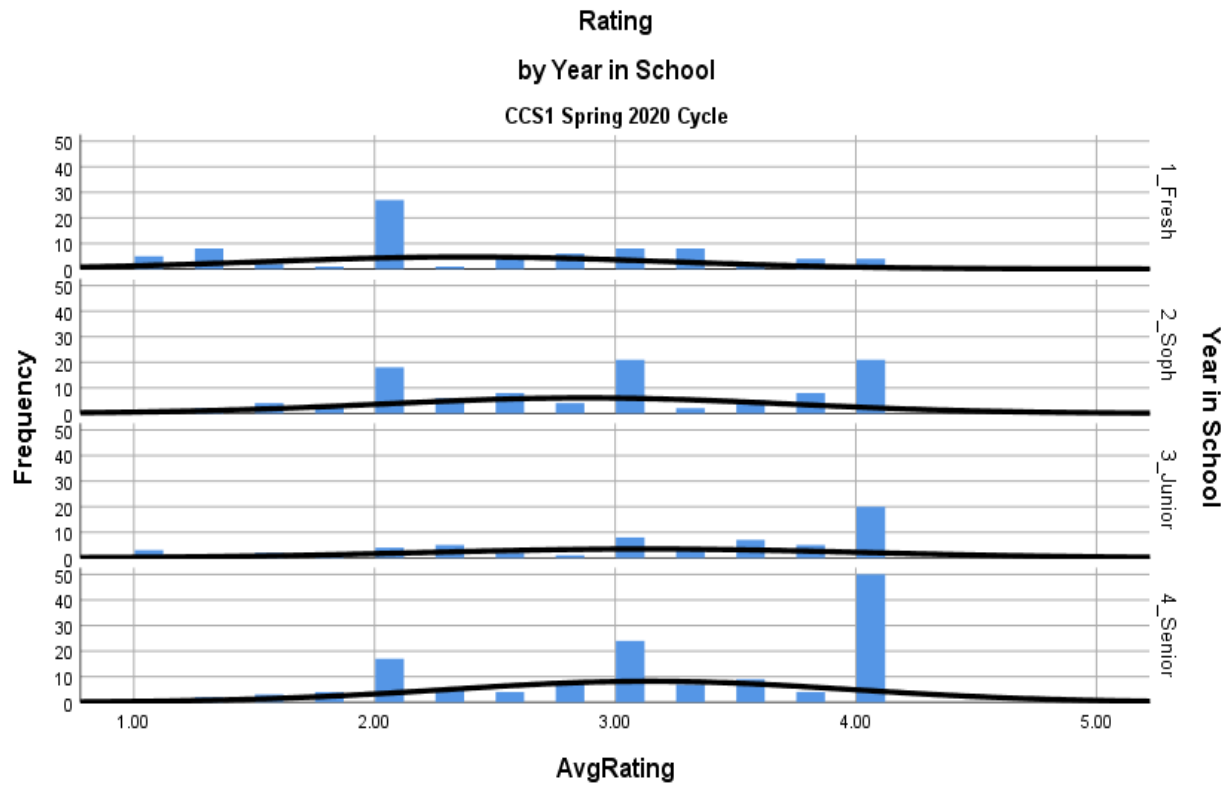
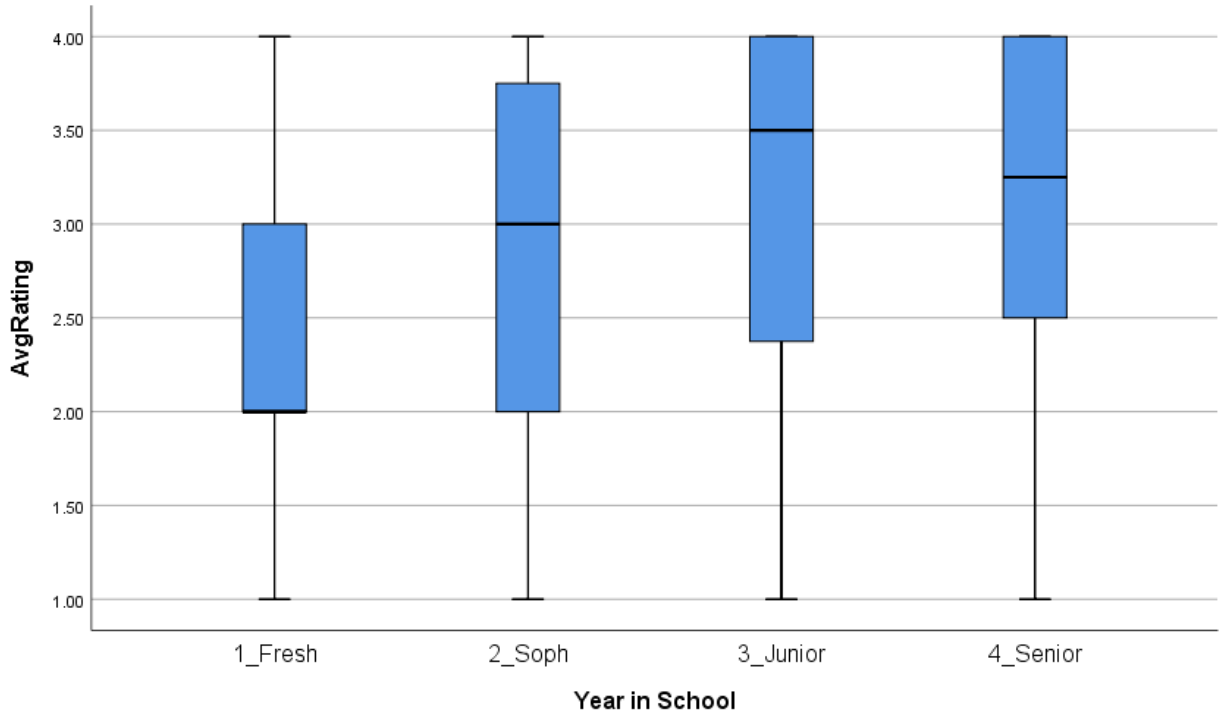
$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-0.308}{.125} = -2.464$$

Skewness is significant at  $\alpha = .05$  ( $|z| > 1.96$ )

$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{-1.061}{.248} = -4.278$$

Kurtosis is significant at  $\alpha = .05$  ( $|z| > 1.96$ )

Distribution is different from normal. Roughly 25% of scores are ceiling. No outliers.



No outliers. Histograms reveal nonnormal distributions. For each class, the sampling distribution is  $n > 30$ . Nonparametric test chosen.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
AvgRating	384	2.9091	.89839	1.00	4.00
School Year	384	2.67	1.166	1	4

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	80	76.99	6159.00
	4	138	128.35	17712.00
	Total	218		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	2919.000
Wilcoxon W	6159.000
Z	-5.876
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 4\_Senior group distributions: AvgRating scores of Seniors ( $Mdn = 3.25$ ) were higher than AvgRating scores of Freshman ( $Mdn = 2.00$ )

$U(N_4 = 138, N_1 = 80) = 2919.000, p < .001$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	80	57.28	4582.00
	3	63	90.70	5714.00
	Total	143		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	1342.000
Wilcoxon W	4582.000
Z	-4.833
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 3\_Junior group distributions: AvgRating scores of Juniors ( $Mdn = 3.50$ ) were higher than AvgRating scores of Freshman ( $Mdn = 2.00$ )

$U(N_3 = 63, N_1 = 80) = 1342.000, p < .001$

Ranks				
	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	80	75.74	6059.00
	2	103	104.63	10777.00
	Total	183		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	2819.000
Wilcoxon W	6059.000
Z	-3.702
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 2\_Soph group distributions: AvgRating scores of Sophomores ( $Mdn = 3.00$ ) were higher than AvgRating scores of Freshman ( $Mdn = 2.00$ )

$U(N_2 = 103, N_1 = 80) = 2819.000, p < .001$

The ANOVA further confirmed the findings.

### Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	80	2.3823	.84399	.09436	2.1945	2.5701	1.00	4.00
2	103	2.8762	.84444	.08321	2.7112	3.0413	1.00	4.00
3	63	3.1230	.90571	.11411	2.8949	3.3511	1.00	4.00
4	138	3.1413	.83979	.07149	2.9999	3.2827	1.00	4.00
Total	384	2.9091	.89839	.04585	2.8189	2.9992	1.00	4.00

### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
AvgRating	Based on Mean	.133	3	380	.940
	Based on Median	.091	3	380	.965
	Based on Median and with adjusted df	.091	3	344.814	.965
	Based on trimmed mean	.080	3	380	.971

Insignificant variance at  $p < .05$

### ANOVA

AvgRating

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.637	3	10.879	14.952	.000
Within Groups	276.486	380	.728		
Total	309.124	383			

At least one significant difference in group means at  $p < .05$

### Contrast Coefficients

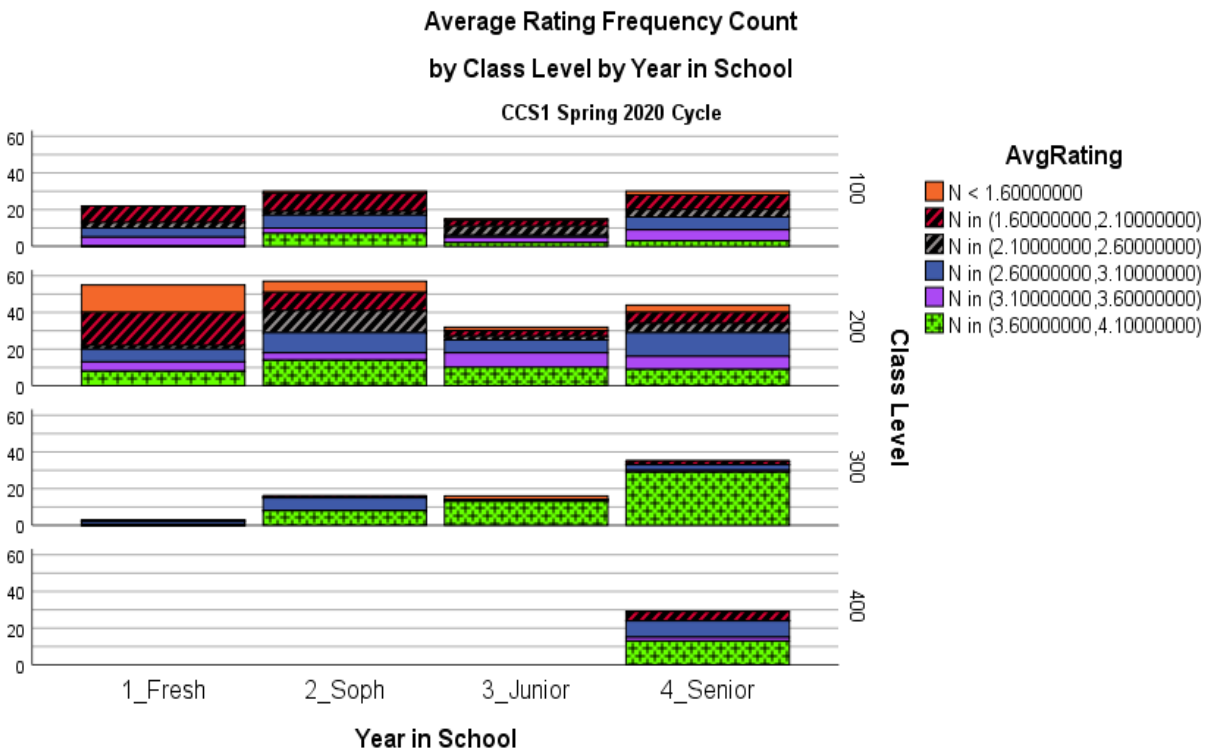
Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

### Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
AvgRating	Assume equal variances	1	.7590	.11986	6.332	380	.000
		2	.7407	.14368	5.155	380	.000
		3	.4939	.12712	3.886	380	.000
	Does not assume equal variances	1	.7590	.11838	6.411	164.467	.000
		2	.7407	.14807	5.003	128.594	.000
		3	.4939	.12581	3.926	170.007	.000



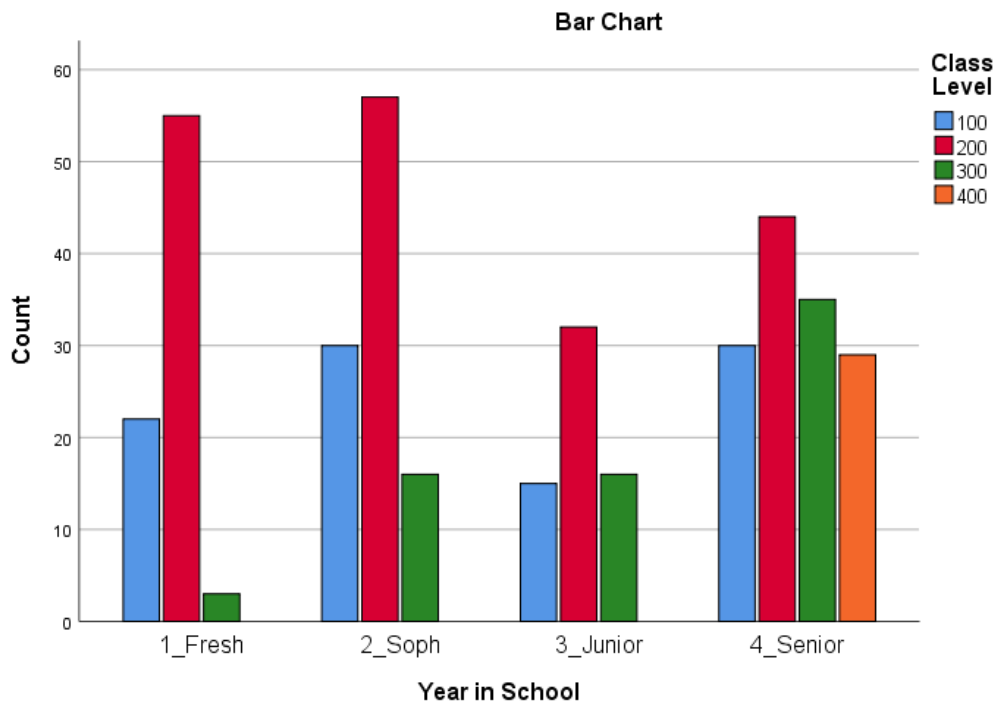
Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	3	1
200	9 = 2:5:2	20.7%; 53.2%; 26% (Ed&Health, CAS, COB)
300	3 = 2:1	87.1%, 12.9%; (Ed&Health, CAS)
400	2 = 1:1	37.9%; 62.1% (Ed&Health, COB)



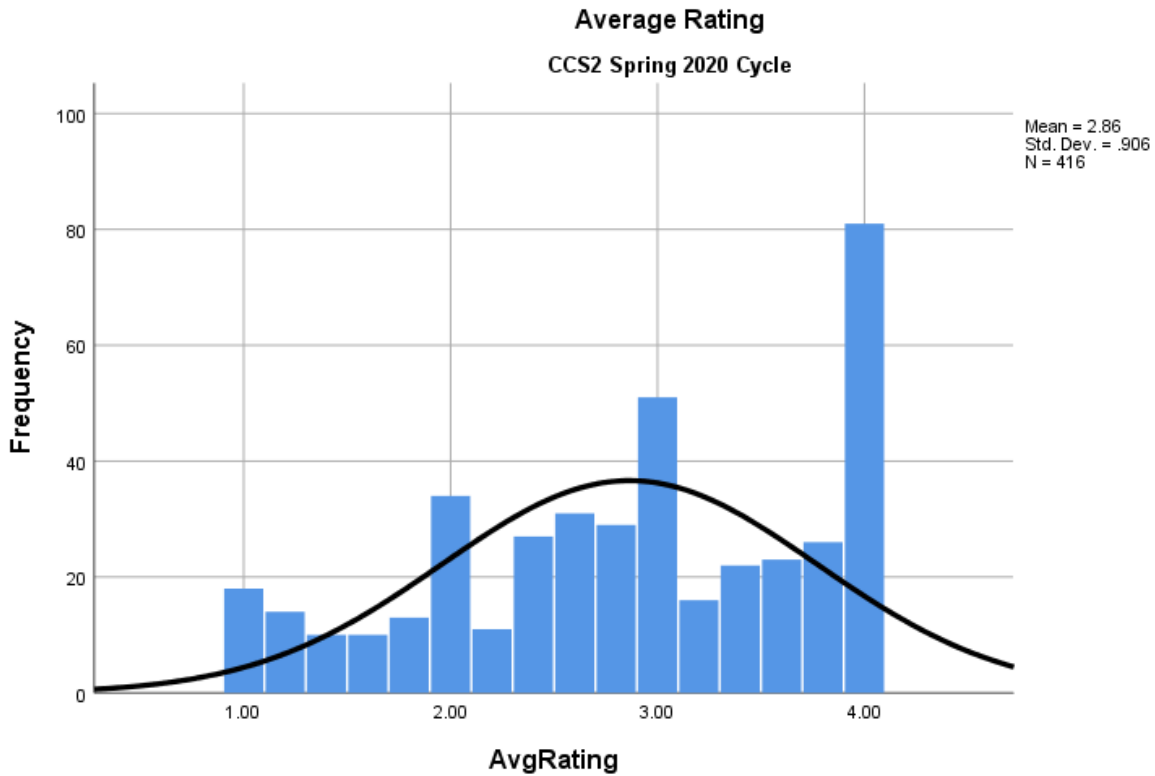
**Year in School \* Class Level Crosstabulation**

Count

		Class Level				Total
		100	200	300	400	
Year in School	1_Fresh	22	55	3	0	80
	2_Soph	30	57	16	0	103
	3_Junior	15	32	16	0	63
	4_Senior	30	44	35	29	138
Total		97	188	70	29	384



In this sample, most students earn this general education credit from 100- and 200-level classes, at 25% and 49% respectively. In this sample, 69% of Freshmen earn this credit from 200-level classes, 55% of Sophomores earn this credit from 200-level classes, 51% of Juniors earn this credit from 200-level classes, and 32% of Seniors earn this credit from 200-level classes. Sophomores received higher scores in 100-level classes.



**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
							Statistic	Std. Error	Statistic	Std. Error
AvgRating	416	1.00	4.00	2.8644	.90593	.821	-.403	.120	-.847	.239
Valid N (listwise)	416									

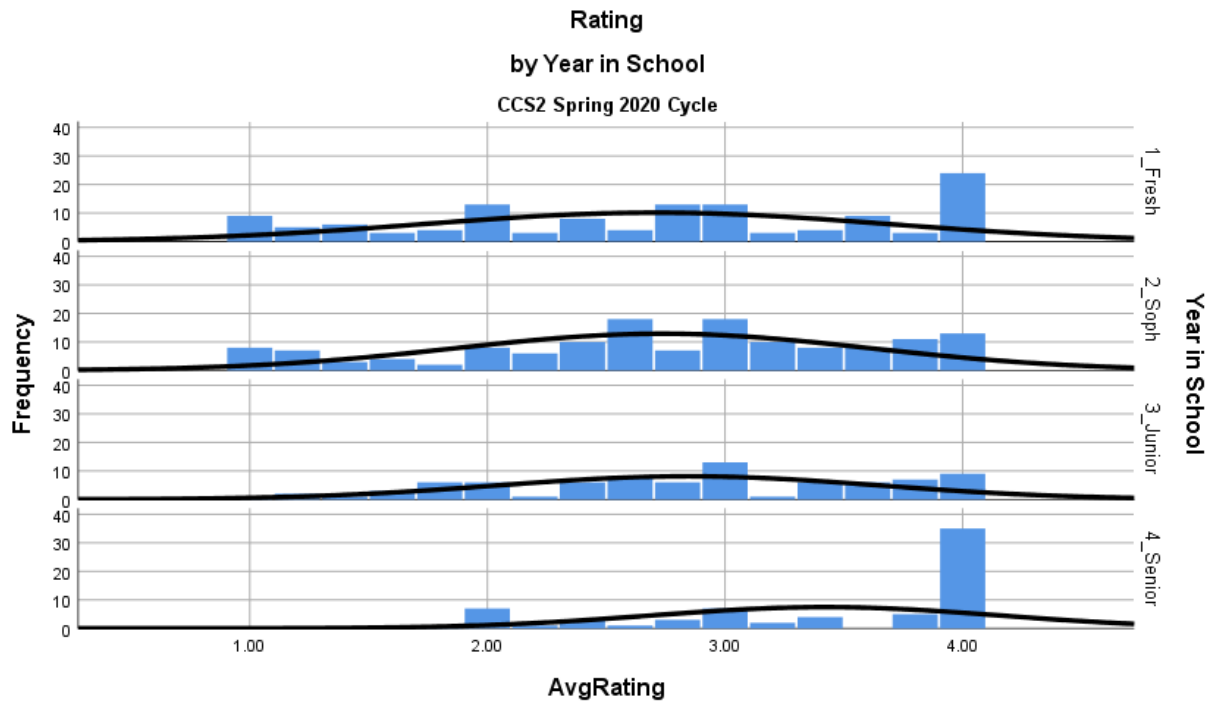
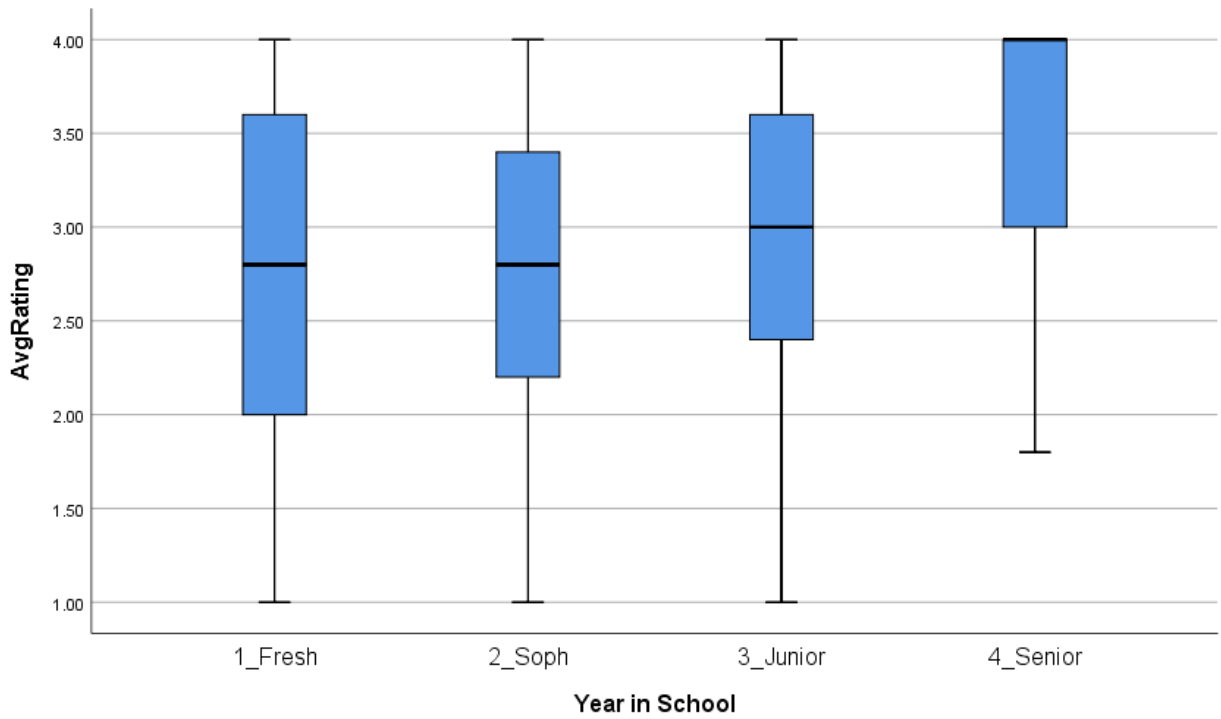
$$z = \frac{\text{skewness}}{SE_{\text{skewness}}} = \frac{-.403}{.120} = -3.358$$

Skewness is significant at  $\alpha = .05$  ( $|z| > 1.96$ )

$$z = \frac{\text{Excess kurtosis}}{SE_{\text{kurtosis}}} = \frac{-.847}{.239} = -3.544$$

Kurtosis is significant at  $\alpha = .05$  ( $|z| > 1.96$ )

Distribution is not significantly different from normal. Roughly 19% of scores are ceiling. No outliers.



No outliers. Histograms reveal 1\_Fresh and 4\_Senior groups have the least normal distributions, with 4\_Senior group approaching a ceiling. For each class, the sampling distribution is  $n > 30$ . Nonparametric test chosen.

### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
AvgRating	416	2.8644	.90593	1.00	4.00
School Year	416	2.23	1.053	1	4

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	124	82.13	10183.50
	4	69	123.73	8537.50
	Total	193		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	2433.500
Wilcoxon W	10183.500
Z	-5.041
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: School Year

Significant difference between 1\_Fresh and 4\_Senior group distributions: AvgRating scores of Seniors ( $Mdn = 4.00$ ) were higher than AvgRating scores of Freshman ( $Mdn \approx 2.80$ )  
 $U(N_4 = 69, N_1 = 124) = 2433.500, p < .001$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	124	100.98	12522.00
	3	82	107.30	8799.00
	Total	206		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	4772.000
Wilcoxon W	12522.000
Z	-.748
Asymp. Sig. (2-tailed)	.454

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 3\_Junior group distributions at  $p < .05$

### Ranks

	School Year	N	Mean Rank	Sum of Ranks
AvgRating	1	124	132.46	16425.50
	2	141	133.47	18819.50
	Total	265		

### Test Statistics<sup>a</sup>

	AvgRating
Mann-Whitney U	8675.500
Wilcoxon W	16425.500
Z	-.107
Asymp. Sig. (2-tailed)	.915

a. Grouping Variable: School Year

No significant difference between 1\_Fresh and 2\_Soph group distributions at  $p < .05$

The ANOVA further confirmed the findings.

### Descriptives

AvgRating

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	124	2.7097	.97792	.08782	2.5358	2.8835	1.00	4.00
2	141	2.7376	.87248	.07348	2.5923	2.8829	1.00	4.00
3	82	2.8463	.80572	.08898	2.6693	3.0234	1.00	4.00
4	69	3.4232	.73767	.08881	3.2460	3.6004	1.80	4.00
Total	416	2.8644	.90593	.04442	2.7771	2.9517	1.00	4.00

### Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
AvgRating	Based on Mean	3.232	3	412	.022
	Based on Median	3.121	3	412	.026
	Based on Median and with adjusted df	3.121	3	369.098	.026
	Based on trimmed mean	3.223	3	412	.023

significant variance at  $p < .05$

### ANOVA

AvgRating

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	26.807	3	8.936	11.733	.000
Within Groups	313.786	412	.762		
Total	340.593	415			

At least one significant difference in group means at  $p < .05$

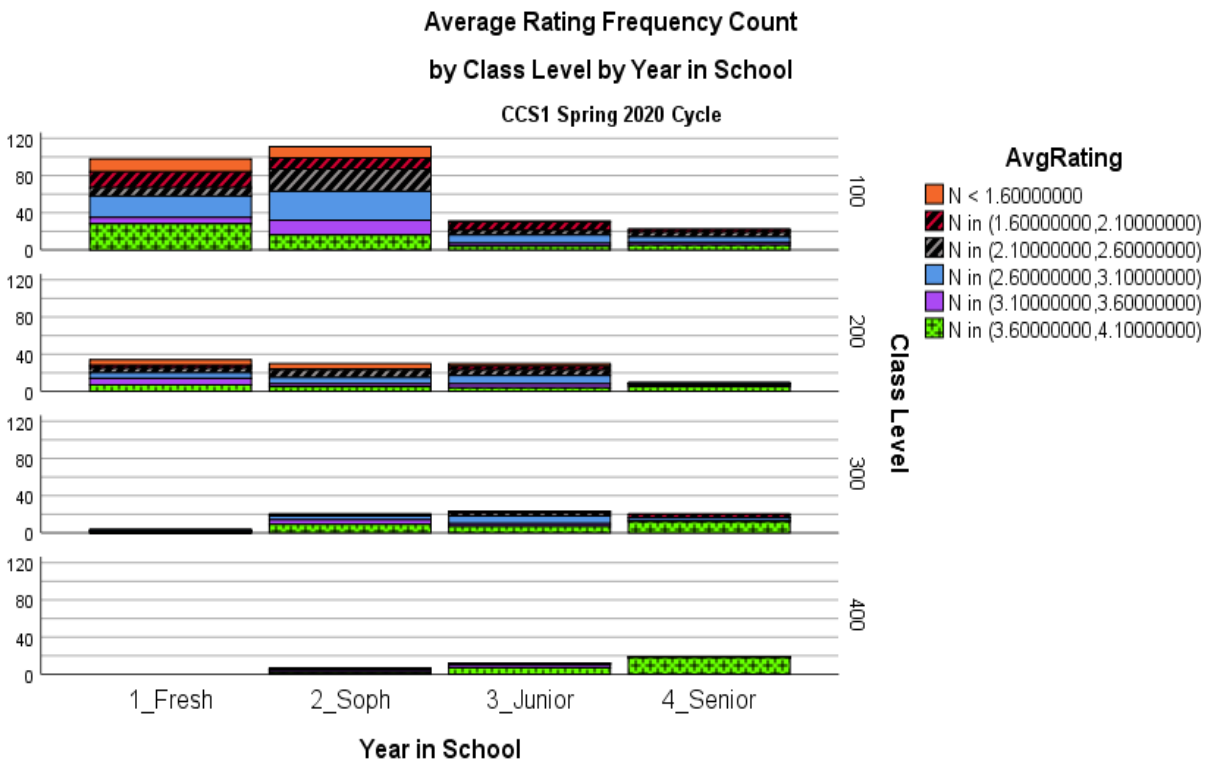
### Contrast Coefficients

Contrast	School Year			
	1	2	3	4
1	-1	0	0	1
2	-1	0	1	0
3	-1	1	0	0

### Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
AvgRating	Assume equal variances	1	.7135	.13107	5.444	412	.000
		2	.1367	.12422	1.100	412	.272
		3	.0279	.10744	.260	412	.795
	Does not assume equal variances	1	.7135	.12489	5.713	174.022	.000
		2	.1367	.12502	1.093	194.273	.276
		3	.0279	.11450	.244	248.494	.808

Class Level	Number of Unique Classes Sampled	Number of Unique Colleges
100	5 = 4:1	96.5%, 3.5%; (Ed&Health, CAS)
200	6	1
300	4 = 1:2:1	35.5%, 32.2%; 32.3% (Ed&Health, CAS, COB)
400	3 = 1:2	78.7%; 21.2% (Ed&Health, CAS)

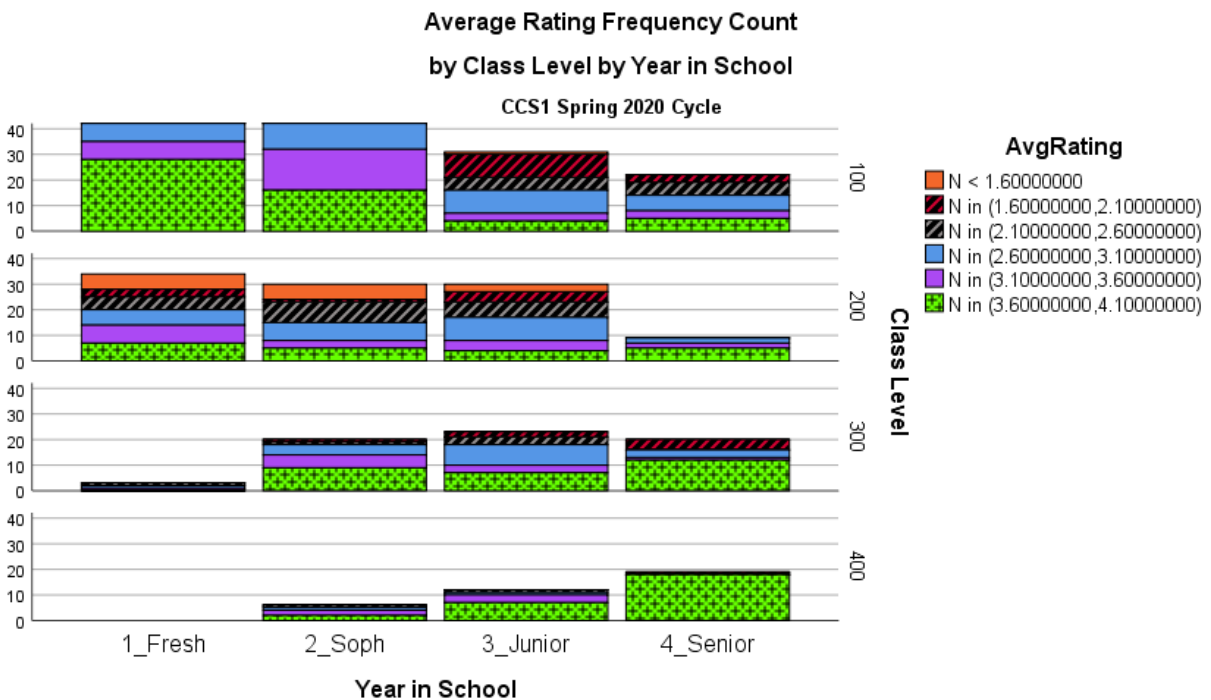
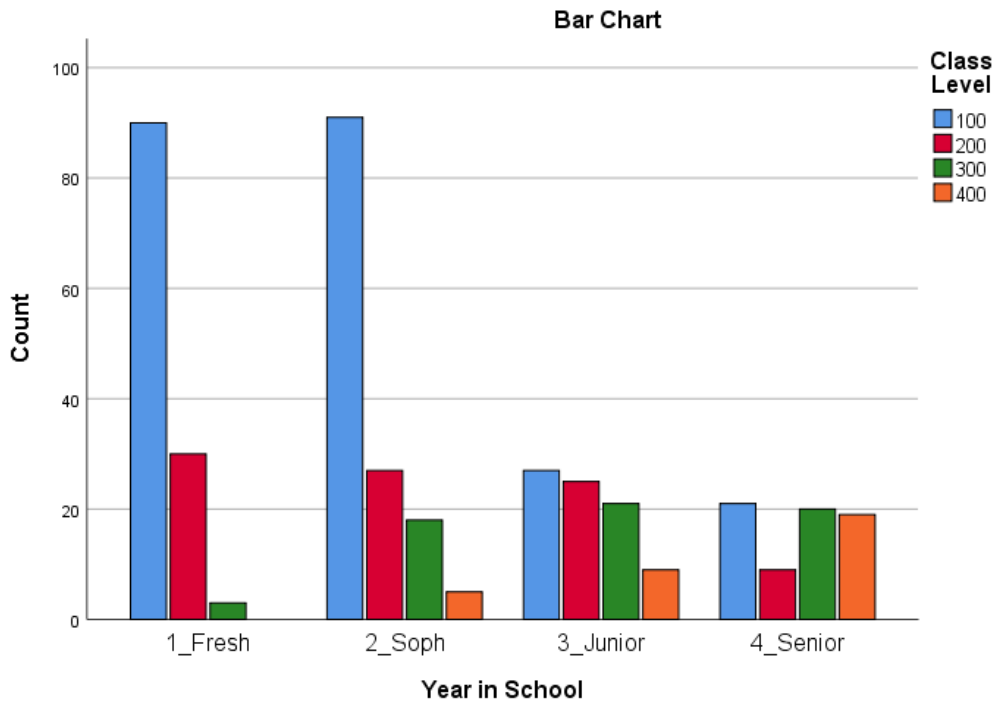


**Year in School \* Class Level Crosstabulation**

Count

		Class Level				Total
		100	200	300	400	
Year in School	1_Fresh	90	30	3	0	123
	2_Soph	91	27	18	5	141
	3_Junior	27	25	21	9	82
	4_Senior	21	9	20	19	69
Total		229	91	62	33	415





In this sample, most students earn this general education credit from 100-level classes, at 55%. In this sample, 73% of Freshmen earn this credit from 100-level classes, 65% of Sophomores earn this credit from 100-level classes, 33% of Juniors earn this credit from 100-level classes, and 30% of Seniors earn this credit from 100-level classes. Sophomores received higher scores in 100-level classes.

