

# Data Pathways: Innovative Approaches to Visualizing Assessment Results

Brad Sturz, Jaime O'Connor, & Delena Bell Gatch

November 2021

## Institutional Context, Assessment History, Processes, and Data Sources

Georgia Southern University is a recently consolidated multi-campus institution with a combined fulltime equivalency (FTE) of ~24,000 students (Georgia Southern University, 2020). Within Academic Affairs, the Office of Institutional Assessment and Accreditation's mission is to support Georgia Southern University's pursuit of academic distinction in teaching, scholarship, and service in a student-centered environment by providing leadership for assessment, institutional effectiveness, planning, and accreditation activities to all academic, student support, and administrative units and programs.

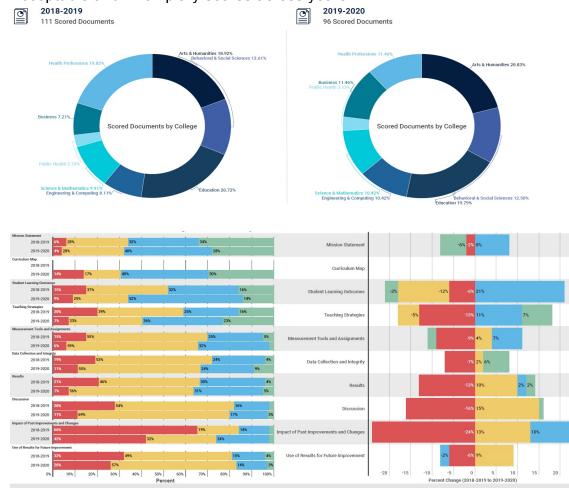
One of the many functions of the Office of Institutional Assessment and Accreditation is the facilitation and oversight of academic program student learning outcomes assessment and general education student learning outcomes assessment. University-level committees composed of faculty members from across colleges are responsible for reviewing annual assessment documents. Using committee established institutional rubrics (Georgia Southern University, n.d.; Georgia Southern University, n.d.), each document is reviewed independently by two individual committee members, and, following the independent individual reviews, both reviewers convene to reach a consensus on a single set of scores and comments. A final reconciliation review is submitted reflecting this agreement, and scores from these reconciliation reviews serve as the data source in all analyses that follow.

Guided by a dedication to a culture of systematic self-reflection, evidence-based decision-making, and improvement, the Office of Institutional Assessment and Accreditation sought to gain insights and actions from our rich set of rubric scores. Given consolidation, we focused on the last two assessment cycles.



#### Academic Program Student Learning Outcomes Assessment

Figure 1 (top panel) provides a summary of assessment documents received for the 2018-2019 (left) and 2019-2020 (right) assessment cycles with a breakdown of total documents scored by college affiliation. Reconciliation scores by year are plotted as a percent of documents scored at each level by each trait for each year. Figure 1 (bottom left panel) shows the percent of documents scored at the Beginning (red), Developing (yellow), Acceptable (blue) and Exemplary (green) levels for 2018-2019 (top bar) and 2019-2020 (bottom bar) for all traits. Although programs vary in the maturity of their assessment processes and cycles, improvements in the assessment process are indicated by a rightward shift in scores. Broadly, this shift should coincide with a decrease in Beginning and Developing scores and an increase in Acceptable and Exemplary scores across years.



*Figure 1.* Top panel. Academic Program Student Learning Outcomes assessment documents received and scored using university-level rubric for the 2018-2019 (left) and 2019-2020 (right) assessment cycles by college. Bottom Left Panel. Reconciliation scores by year plotted as a percent of documents scored at the Beginning (red), Developing (yellow), Acceptable (blue) and Exemplary (green) levels for 2018-2019 (top bar) and 2019-2020 (bottom bar) for all traits. Bottom Right Panel. Year-over-year percent change in documents scored at each level for all traits. Note. Due to rounding, percents may not sum to 100% and percent changes may not sum to 0%.

To assist with direct comparisons across years and to more explicitly isolate changes in the allocation of scores at the four levels across years, Figure 1



(bottom right panel) shows the year-over-year percent change in documents scored at each level for all traits. A couple of specific points are worth noting. First, the University mission statement was established during consolidation in 2018 and subsequently revised in 2019, and the decrease in Exemplary scores for the Mission Statement trait was largely due to documents referencing the prior University Mission. Second, the Teaching Strategies trait originally contained reference to both instructional strategies as well as a curriculum map. Following the 2018-2019 cycle, the Teaching Strategies trait was revised such that it referenced only instructional strategies which shifted the curriculum map to its own trait, and the absence of curriculum map scores and year-overyear changes resulted from these rubric modifications. Third, with consolidation, a greater than average number of programs submitted an assessment plan in the 2018-2019 cycle and complicated the assessment of the impact of past improvements. Although more pronounced for some traits than others, there was an overall rightward shift for scores coupled with decreases in Beginning and Developing scores and a resultant increase in Acceptable and Exemplary scores to provide indicators of assessment process improvement.

With a high-level summary of results established, we call attention to a recent NILOA AiP article in which Gaudino-Goering (2021) outlines an approach to identifying assessment challenges faced by individual programs at the institution by creating a rating system on a Likert scale from 0 to 4 for relevant accreditation standards, and then applying a color-coding scheme to the resultant values such that a heat map emerged displaying "hot" and "cool" zones. These zones provided opportunities to quickly identify areas in need of attention, and application of this approach across years provided insight into improvements made over time.

We were especially interested in gaining institutional-level insight into performance on our rubric traits (and by extension individual components of our institutional assessment process), and our approach involved variations from that of Gaudino-Goering (2021). Utilizing our year-over-year changes to the allocation of scores at the four levels for each trait, Figure 2 (top panel) shows a heat map in which red indicated a year-over-year decrease in percentages whereas green indicated a year-over-year increase with color saturation reflective of the magnitude. Interpretation is straightforward with reds indicating a year-over-year decrease and greens indicating a year-over-year increase. Year-over-year improvements are also indicated by reds being spatially located left of greens.

Trait	Beginning	Developing	Acceptable	Exemplary
Mission Statement	-2.096	0.096	8.0%	-6.0%
Student Learning Outcomes	-6.0%	-12.0%	21.0%	-3.0%
Teaching Strategies	-13.0%	-5.0%	11.0%	7.0%
Measurement Tools and Assignments	-9.0%	4.0%	7.0%	-2.0%
Data Collection and Integrity	-7.0%	2.0%	0.0%	6.0%
Results	-13.0%	10.0%	2.0%	2.0%
Discussion	-16.0%	15.0%	0.0%	1.0%
Impact of Past Improvements and Chan	-24.0%	13.0%	10.0%	0.0%
Use of Results for Future Improvement	-6.0%	9.0%	-2.0%	0.0%



2018-2019 Pathways					2018-2020 Pathways													
Trait						Trait												
Receivery	Remplay	Revealery.	Revenue y	Annytein	Acceptation	Drestanty	Squary.	Developing	Second second	Second second	Second Second	Second Second	Annalatio	Second second	Receiver.	Second Second	Sectors.	in the second second
Sampley .	Sampley .	Receptory.	Asceptable Receptory	Graduating .	Asseptation	Granissing	Squarg.	Drockasty,	Secoley.	Sampley.	Revolay.	Rempley	Anophitic	Servicy.	Aurphälte	Aurphoter	Anophilie	Aurphile
Remplay	Sampley	Acceptable Acceptable	Acceptable	Acceptable	Anaptaine	Acceptable	Squarq.	Acceptatio	Barrylay	Samplary	Revealey	Revealery	Aurphäite	Drettery	Drotteng	Developing	Brokeny	Drettang
Samplary.	Sampley Sampley	Acceptation	Acceptation	Aurplater	<b>Dronkaling</b>	Acceptation	Acceptable	Aceptain	Revolate	Revolay.	Revolate .	Recipley.	Acceptation	Oronhama Oronhama	Drefsaring Drefsaring	Doctory,	Segurity.	Oreflatte
Receptory.	Receiptory.	An epidice	Desting	Desting	Acceptation	Acceptable	Squarg.	Oraclinity.	Secoley.	Sattplay.	Sampley.	Bretain.	Brethalty.	Brefights.	Destants	Brefarig.	Destinity	Bretart
Remplay	Remplay	Developing	Destany	Brokery	Aurplater	Developing	Druckastra	Destarts	Sampley.	Sampley.	Aurphäle	Aurplater	Ornhama	Douting the	Aurplater	Destang	August	Acceptabl
Samplary Samplary	Sampley	Beyring .	Gronicating	Beginning	Seguring .	Southang .	Beginning.	Berning	Sampley.	Sampley Sampley	Anophilie Anophilie	Ornhams.	<b>Drachastry</b>	Service -	Oracle and a	Ornhaits Ornhaits	Service of	Drehats Drehats
Barryley.	Asceptable	Sampley.	Rarrylay Rarrylay Asception Asception	Anopiate Designing	Asceptation	Drefuging .	Squarg.	Destada	Seculary.	Sampley.	Orestants.	Sampley.	Oreflating.	Anephaise Anephaise	Dronbastry.	Gronbartig	Acceptation	Acceptate
Barrylay	Astrophylor	Remplay	Ausphälle	Ausplater	Grant and a	Asseptation	Acceptable	Rempley	Sampley.	horpteller	Revelag.	Remplacy	Rannylary.	Samplary.	Acceptable	Aurplater	Acceptation	Rempley
Revulay Revulay	Acceptable Acceptable	Sampley Sampley	Acceptable	Graduing Aurobaker	Acceptation	Dorstang Accession	Acres of	Orentarra Accessible	Secoley.	Asceptable	Receptory.	Asceptory.	Aurphilie	Destining.	Aurphote	Decharty.	Aurphote	Asseptatio
Sampley.	Acceptable	Sampley Asceptible	Anophitic Anophitic	Sampley	Destany	Destance	Squarg.	Designing	Servicy.	Acceptable.	Astephilite	Rannplacy	Ausphälle	Augd-681	Aurplake	<b>Bretung</b>	Aspenty -	Grenants
Remplacy	Acceptable	Acceptable	Destining	Draftang	Acceptation	Squarg.	Report	Berneg	Samplay Samplay	Aurphäir	Acceptable Acceptable	Antephalite	Acceptable			Aneplain	Orwiteing.	Greekans
Barrylay,	Aurphäite	Acceptable Acceptable	Drefung Drefung	Descharting.	Dreshaving Branners	Anteplate.	Brances	Acceptation	Sampley,	Acceptable	Acceptable Acceptable	Aurphälle	<b>Dratiang</b>	Acceptable	Gronhasting.	Graduates.	An epider	Gronbarts Charling of the
Barrylay	Astrophylor	Orwitering .	Developing	Asceptable	Destaging	Acceptable	degrang	Orwiteing	Sampley.	Anaplaise	Anophilie	Antephatter	Graduate	Orwhat's	Brochastra.	<b>Desharts</b>	Brothans	Developing
Barrylay	Aurplater Gronieng		Ausphälle		Drocketting	Drefuging	Burning.	Aceptate	Sampley Sampley	Aurphate	Anophile .	Drefung Drefung	Graduating Graduating	Drochart g	Averyletter Developing	Gronium g	Report of	Greekang
Sampley .	Groning Groning	Remplacy	Gronigsong Asseptistics	Gronie mg	Greekang,	Orwitesity Orwitesity	Squarg.	Orwinging Developing	Sampley Sampley	<b>Orwhaning</b>	Acceptable Acceptable	Aurphalie	Acceptable	Donising.	Acceptation	Acceptation	Orcharts	<b>Dryfield</b>
Remplay	Granitant w	Aurolalie	Destanty	Developing	Destanty	Granitanta	Squarg.	Berneg	Xamplary	Orefloria Samplay	<b>Dortlants</b>	Aurphan	Destination.	Aceptativ	Aurphoter	Aurphote	Aceptatio	Destights
Receptory.	Drankang.	Acceptable	Draftering	Bernplay	Acceptation	Aurphähr	Aurplaite	Aurphalie	Acceptable Acceptable	Sampley,	Sampley.			Acceptation	Average and the	Acceptable Development	Begroung	Brochastra Brochastra
Samplary .	Drocksong Drocksong	Orwising .	Divertisation Divertisation	Drocksong Drocksong	Anaphilie	Drockaring Drockaring	Accelding	Draftang Draftang	Aurpheiter	Sampley Sampley	Acceptation Acceptation	Sampley.	Ausphälte	Drefung.	Rempley	Receptory	Receptory	Sample y
Barrylay	Drockang	Dreshaining	Deskawa	Draffield	Destant	Destant	Asceptaite	Dreitging	Ausphälter	Barryley	Aurphäite Aurphäite	Ausphälte	Acceptator	<b>Doublety</b>	<b>Drotharing</b>	Großung	Greenange	<b>Brythann</b>
Samplary.	Dretting.	Granitating	Granicating	Designey	Squarg	Barrey	Reports	Reports	Aurphälte Jacephälte	damala's	Avendation	Accendidate	Developming	Owners	Bayroog	Bearing	Aquin	Segure a
Revealery.	Drocksong.	Square of	Graduate a	Asseptation Assertation	Anophiate	During	Anopistic Revealed	Drocksong Name	Aurphole Aurphole	Receivery.	Anaphilie Droshqurg	Bayerson .	Sectors.	Aquera .	Decharge.	Orefung.	Squarg.	Seatory.
Remplacy	Beyrning	Destang	Grankerry	Report	Gronauty	Dretary	Squarg.	Owners	Antephalie	Sampley.	<b>Orientianing</b>	<b>Drothern</b>	Dentary Dentary	<b>Doubletty</b>	Acceptator	<b>Dryburg</b>	Orchasta	Destants
Receptory Asseptation	Revealey.	Repring	Descharting Acceptable	Granut and American Street	Acceptable Acceptable	Bernplay	Acceptable	Acceptable	Aurphan	Receptory.	Aspendig .	Brochasting.	Gratharty,	Orochastra .	Overlage .	Orefung.	Report of	Square.
Acceptable	Sampley	Sampley Asceptato	Graduary	Receptory Acceptable	Revealery	Acceptable	Squarg.	Barriplary	Acceptable	Asepteite Asepteite	Acceptable	Sampley	Ausplater	Sampley.	Sampley	Acceptable	Acceptable	Aceptable
Aurphälte	Sampley	Granitating	Developing	Aurphälte	Acceptation	Acceptatio	Aneptatio	Aurphälte	Anaplater	Aurphoise Aurphoise	Anophike Anophike	Rempley.	Aurphone	Acceptance .	Aurpleiry .	Rampley.	Bayroug	Aurphote
Anophilie	Aurplain	Remplay	Anephálie Anephálie	Acceptation	Anaphilia Drochang Drochang	Distant a	Reports of	Anaphilia	Aurphäle Aurphäle	Acceptable Acceptable	Asseptation	<b>Jacoptable</b>	Anteplativ	Anephalie Anephalie	Asceptaine	Acceptable	Anophilie	Anophitic
Aurphälte	Asceptable	Receptory Assertation	Brattang	Brothamy	Destang	Brankastra	Bequiry.	Report	Ausphäler	Aurpheite	Antephtite	Antephtie	Gentlers.	Oreflatty.	Acceptable	<b>Destant</b>	depart of	Square.
Aurphaler	Aurphäller	Anopisie	Acceptable	Dreitung	Acceptatio	Granuping	Bayroom	Squarg	Aurobale	Aurphäite Aurphäite	Aurolater	Aurabellie	Oracles in a	Grefields.	Destination	Orwhains, Orwhains	Squary	Droftallin
Acceptable Acceptable	Aurphöller Aurphöller	Acceptable Oronhamu	Drefsprig Asceptator	Dructuring Dructuring	Aurphäir Drothning Aurphäir	Drefuging Drefuging	Reposing Accession	Survey .	Aceptate	Acceptable	Acceptable Acceptable	<b>Druckating</b>	Acceptable	Sampley Acceptable	Remplacy. Acceptable	Acceptable	Overlating	Beetan
Aurphäller	Asceptator Ascentator	Granitating	Anaphilie	Destanty	Aneplatic	<b>Drettering</b>	Report	Designing	Aurolder	Ausphälte	Anoptatio	<b>Druckssing</b>	Developing	<b>Drefung</b>	Developing	<b>Brechante</b>	Berneg	Square a
Acceptato	Aurphäir	Destring	Destant	Aceptain	Revising	Acceptable	Developing	Draffigling	Acceptator Acceptator	Aceptable	Division of the local	Ausphälle	<b>Druckspring</b>	Greekastar	Acceptable Developing	Granium .	Graning in	Graduate
Aurphälte	Acceptable	Oracleaning Oracleaning	Drucksong Drucksong	Acceptable	Granitating Assessed	Destant	Berneg	Designing .	Ausphälter	Aurphilie Aurphilie	<b>Drefteng</b>	Aurplater	Orwholes	Dorfsame.	Brefisity.	Gordianta.	<b>Dretharing</b>	Dorbatis
Anephaler	Aurphälle	Destand	Graduater	Draftsing	Orania and	Destade	Destado	Devilation	An oral dates				1 martine	Developing.	Aurplate	Deelianty	Greekang	Destada
Aurphälle	Acceptable	Statute of	Drefung Drefung	Drestancy Drestancy Beyrney Asceptation Drestancy Asceptation	Anaphilie	Drefuniting Drefuniting	Squarg.	Auguring	Acreditor	Acceptable Acceptable	Orwitants.	Destang.	Graduating Graduating	Greekang Greekang	Droftering Aurolator	Granitating Granitating	Destinents Averal dire	Destants.
Aurphäller	Astrophylor	Squarg.	Developing	Squarg.	Burney .	Barrent	Squarg.	Aquest	Aurphäir	Anaplatic	Report of Asceptable Asceptable	Ausphälte	<b>Brothamp</b>	<b>Developing</b>	Anophilie	<b>Donhasta</b>	Ausphälte	Destants
Acceptator	Grantening.	Acceptation	Drokerty	Drefuging	<b>Drutinity</b>	Grantusting.	Graduate	Drottering	Aceptate	Desthaling Desthaling	Aurphälle	Graniants.	Graning Street opting	Bearing	Dronhaning.	Grania ma	Square	Greekans,
Aurphälte	Drefung Drefung	Orwiseing .	Aneplaite	Anaplatic	Anaphalia Oronhasing	Drefuging Drefuging	Oranizating Oranizating	Druckasing Druckasing	Aurphoise Aurphoise	Gentaria.	Developing Developing	Orwhants.	Acceptable	Acceptable Drockastry	Orwing strag	Destants.	Aughter	Destate
Asseptation	Drocksong.	Grottering	Acceptable	Drustanty.	Drontours;	Grankasing	Second .	Acceptable	Aurphate	Aquera	Ausphälle	<b>Deetsurg</b>	Destination	Oreflatts.	Developing	<b>Orienteene</b>	<b>Deetlants</b>	Developing
Aurphähr	Groning.	Graning .	Drucksorg	Destants	Grantiguing	Drefunda	Bretaria	Granitating	Acceptable Acceptable	Service.	Aurphote	Ausplater	Orwhon's Orwhon's	Gronium and	Drefsalling Drefsalling	Granitating.	Sectory.	Drefunts Drefunts
Aurphäller	Grantiguing Grantiguing	Orwitesing .	Chronicastra Ascendidate	Druckastar Druckastar	departure Accession	Reprint a	Squarg.	Squarg.	Dreftarra.					Developing.	Dortal a	Orabatia.	Oreflating.	D-p-harts
description	Destating	Equiring Equiring Equiring Equiring	Gradupting	Draffigling	Drathaling	Dratiging	Descharting	Draffigling	Grebarg.	Sampley.	Aurphale Dretharing Dretharing	Sampley.	Arrighty	Sampley	Brehalty	Orefland a	Square.	Griefiants
Aurphaler	Grontening	Reported	Developing	Barrent	Destand	Barrent	Report	Designing	Dreftang.		Christian and	Aurphoide.	Acceptation	Drefuging.	Greekasta	Developing	Aurphoise	Acceptable Developing
Acceptable	Descharting.	Report of	Second Second	Report of	Drockastry Drockastry	Graduating Graduating	Greekang Greekang	<b>Drollaring</b>	Overlaping.	Aurphole	Aurphoise Aurphoise	Remplacy Associate	Aurphälle	Gronium .	Aurphälle	Orwhang Aurobald	Second Second	Greekers Auroldin
Aurphälter	Report of Language	Sequery.	Square.	Aques	Squarg.	Destanty	Squarq.	Orwitaria	Overlang.	Aurphoise.	Aurphain	Auspieler	Auspheite	Aurphaine	Acceptable	Destants.	Augusta.	Beatran
Drokeng	Barrylay	Acceptation	Brokery	Draftang	Granissing	Dreiferig	Rearing	Drottang	Druthamy.	Asseptation		Acceptable	Acceptable	Avenues.	Averal date	Drefung Drefung	Drohaing.	Squarg.
Drucketty,	Receptory Acceptable	Asceptation	Angening	Draftang.	Begroung .	Begreen at	Squary.	Service .	Deshare.		Acceptation Acceptation	Ausphälte	Orwinson,	Orechang.	Bearing .	Reporter	Begrang	Bearing
Designed	Astrophylor	Barrylay	Grankasing	Designing	Square	Byrng	Barring	Barring	Grandward	Aurplatie	Reports	Drohong	Drockang	Dreturn	Brankarry	Dresharing	Drehaung	Squarg
Druckarry	Aurphäir Aurphäir	Acceptable Acceptable	Description of	Acceptable	Drockstry.	Dreitung.	Squarg.	Aceptate	Orefung.	Drefung Drefung	Acceptable Acceptable	Brefairs.	An epidie	Barryley.	Aneplate	Acceptable	Ausphälte	Orwhang Orwhang
Drockson a	Acceptable	<b>Durkstry</b>	Gronium	Gronien and	Anaphilie	Durkany	Bearing .	Gronien a	Destang.	<b>Denhang</b>	Developing	Orthers	Devisions	Greenang.	<b>Drefteng</b>	<b>Destang</b>	Agenta	Beyrning
Drailarra	Aurplate	patrick.	Barris	Rynny	Squary.	Square	Burning	Square .	Orenorgy.	Green gang	Destants	Aquing	Bearing.	Barren	Barrent	Brokery.	Aquerg	Breisers
Druckerry,	Gronie and	Samplary Asceptator	Graduate Asceptator	description of	Grontant of	Grantung Grantus	Granuplette	Averal dis-	Orenhama.	Orectary.	Report of Labor	Destang.	Doubleton .	Acceptation	Aurpholic,	Destants.	Squite.	Doublant of
Drahang	Drotterry		Asceptation	Ausphäter	Destant	Designey	Overlaping	Durkery	Grankarra	Square a	Aurphäite	<b>Avriant</b>	Brydants	<b>Drefugers</b>	Greekeng	Developing	Breharin	Dertain
Drukeng	Destany	Dressing	Ausphälte	Asseptation	Aurphäir	Acceptation	Aceptaire	Drokeng	Deethorny.	Square .	Dorphale,	Drefung.	Graning Graning	Greekarts.	Gronhasting.	Grankarra .	Squing	Donharty.
Dreshave .	Gronius and	Granisation of	Granicating Granication	Drocksong	Acceptable Oronhastics	Drefung Drefuging	Squarg.	Graduate .	Destang.	Square.	Orwitering .	Owners.	Drohama .	Orothang .	Overlants.	Drefung.	Augusta .	Donhama .
<b>Dreiterry</b>	Drotterry	Groniera	Drohawa	Drokeny	Squary.	Square	Service.	Squarg	Orenary.	Square	Agenty	Destant	Rents	Owners	Destang	Agenty	Deetarta	Aquera
Dretterry.	Brokeny.	Graduating.	Squarg	Granitation	Grotery.	Druckarry.	Acceptatio	Großeng	Burning.	Grothamp.	Acceptation	Drefung.	Acceptation	Report of	Grantesta .	Augustag .	Orehouse	Acredate
Drefung.	Drestang.	Owners.	Square .	Bearing	Survey .	Barring	Square,	Square a	Begroung	Doublet's	Grontering.	Orcharts	Deetharm.	Squary.	Dreftarts.	Square.	Square a	Brebatt
Drokeng	Destany	Berry	Barren	Squarg	Burning	Destant	Ramon	Destand	Bourse.	Bours	Owners	Reports	Barris	Orochastry.	Aurolate	Deptace	Destana	Bourse.
Graduate .	Squary .	Dreitung.	Draftanty Draftanty	Drokeng.	Anaphaire Drockating	Dreitung .	Repairing	Drefuging .										
Drukeng.	Square	Destang	Destant	Destang	Bearing.	Square a	Orsheng .	Squarg										
Destant	Beyrning	Bequire a	Destany	Destang	Destang	Squarg	Squarg.	Berneg										
Dreshamp.	Squary .	Squarg.	Bearing .	Designey	Surgering .	Squarg.	Barris .	Square .										
Destanty	Burning	Aquera	Barries	Square	Beyring	Series .	Burning	Squarq										
Baytong	Drefung Drefung	Granizang.	Burning .	Barrent	Squarg .	Squarg .	Squarg.	Barren										
	Brokery	Oraniana (	Square.	Sec.	Supremy .	Survey .	Sugaring .	Sec.										
Sec. 1				and a second	and and a	and and	and the second	Bearing .										
Squarq Squarq Squarq	Beyrning .	<b>Droham</b>	Bretiging	Square.	galantal.	Contract of the local division of the local	and other R											
Arguing Arguing Arguing Arguing	Reprint of	Designed Bayester	Station of	Report of the local division of the local di	Drankying Drankying	David and a	Rente	Orwitights Reports										

Figure 2. Top Panel. Heat map of year-over-year percent change in academic program student learning outcomes assessment documents scored at each level for all traits. Red indicates a decrease. Green indicates an increase. Color saturation is representative of change magnitude. Note. Due to rounding, percent changes may not sum to 0%. Bottom Panel. Heat map of individual academic program assessment document trait scores (Beginning = red, Developing = yellow, Acceptable = blue, Exemplary = green) for 2018-2019 (bottom left) and 2019-2020 (bottom right) sequentially sorted by subsequent level and trait.

Of note, an ideal state would be characterized by reds being isolated to Beginning and Developing and greens being isolated to Acceptable and Exemplary. Although interpretation of the heat map does not differ from the percent change plots, the heat map serves as an alternative visualization that highlights the flexibility and scalability of heat maps to aid in providing quick insights into the assessment process.

In addition to our interest in these institutional-level summaries, we were also interested in drilling into specific programmatic results. To this end, we created additional heat maps more analogous to those outlined by Gaudino-Goering (2021) in that we utilized a color-coding scheme with single colors reflecting a Likert-style rating of levels (Beginning = red, Developing = yellow, Acceptable = blue, Exemplary = green). This scheme was applied to individual academic program documents for the 2018-2019 (Figure 2, bottom left) and 2019-2020 (Figure 2, bottom right) academic program student learning outcomes assessment cycles. To aid in interpretations and insights we also sequentially sorted the heat maps by level and trait. Starting with the Mission Statement Trait, we sorted program documents from Exemplary to Beginning. The next trait was then also sorted from Exemplary to Beginning but in such a way that it occurred within each category of the previous trait. This procedure of sorting within each category of the antecedent trait continued for all subsequent traits and resulted in the emergence of what could be categorized as trajectories or pathways through the rubric traits. The conception of progression through the rubric trait levels as pathways prompted discussion about pathway complexity and how we might best visualize this complexity to permit qualitative and quantitative insights.

Fortunately, flow diagrams can represent changes in structure or allocation, and Sankey Diagrams (Heslin, 2017), specifically, can visualize the flow of one set of values to another. Nodes are connected via links, and Sankey diagrams are used to show a many-to-many mapping between two domains or multiple paths through a set of stages (Google, n.d.). Although there is some taxonomic debate, an alluvial diagram is a specific type of Sankey diagram that visualizes allocation across categorical dimensions (Bojanowski, 2016; OriginLab, n.d.; Peterson, 2020), and we applied this alluvial visualization to illuminate the pathways of our 2018-2019 (Figure 3, top panel) and 2019-2020 (Figure 3, bottom panel) assessment data through the four levels of our 10 traits.

Specifically, we started with total number of documents and visualize how these documents distribute across the four levels of the Mission Statement trait with Beginning (red), Developing (yellow), Acceptable (blue), and Exemplary (green). This process was repeated for each trait, and the resulting visualization provided us with a rich source of information from which to draw insights about our assessment process.

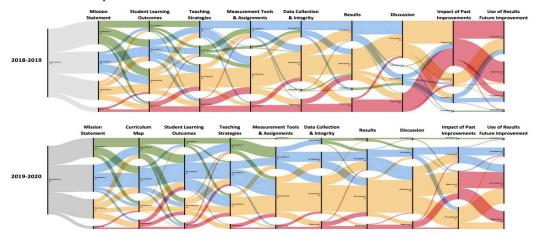


Figure 3. Alluvial visualization of 2018-2019 (top panel) and 2019-2020 (bottom panel) academic program assessment data through the four levels of the rubric's 8 traits. Numbers reflect counts. Colors reflect levels. Beginning (red), Developing (yellow), Acceptable (blue), and Exemplary (green).



#### **General Education Student Learning Outcomes Assessment**

We adopted an identical approach to general education student learning outcome documents received for the 2018-2019 and 2019-2020 assessment cycles and presentations of these analytic strategies shown in Figures 4-6 parallel those previously shown for Academic Program Student Learning Outcome Assessment. Of note, all core courses fall into one of our general education and core curriculum student learning outcome areas:

- Area A1 Communication Skills
- Area A2 Quantitative Skills
- Area B Institutional Option (Global Engagement)
- · Area C Humanities, Fine Arts, and Ethics
- Area D Natural Sciences, Math, and Technology
- Area E Social Science

Distribution of documents scored by these core areas are shown in yellow in Figure 4 top right panel.



Figure 4. Top panel. General Education Student Learning Outcomes assessment documents received and scored using university-level rubric for the 2018-2019 (first) and 2019-2020 (second) assessment cycles by college (blue) and Core Area (yellow). Bottom Left Panel. General Education Student Learning Outcomes assessment document reconciliation scores by year plotted as a percent of documents scored at the Beginning (red), Developing (yellow), Acceptable (blue) and Exemplary (green) levels for 2018-2019 (top bar) and 2019-2020 (bottom bar) for all traits. Bottom Right Panel. Year-over-year percent change in General Education Student Learning Outcome assessment documents scored at each level for all traits. Note. Due to rounding, percents may not sum to 100% and percent changes may not sum to 0%.



Trait	Beginning	Developing	Acceptable	Exemplary
Course Alignment	-3.0%	-7.0%	-5.0%	16.0%
Teaching Strategies	-3.0%	-4.0%	-4.0%	12.0%
Measurement Tools and Assignments	3.0%	-12.0%	6.0%	5.0%
Data Collection and Integrity	-1.0%	-8.0%	8.0%	-1.0%
Results	-15.0%	5.0%	8.0%	4.0%
Discussion	-14.0%	17.0%	-4.0%	2.0%
Impact of Past Improvements and Changes	-53.0%	26.0%	25.0%	4.0%
Use of Results for Future Improvement	-20.0%	17.0%	0.0%	2.0%

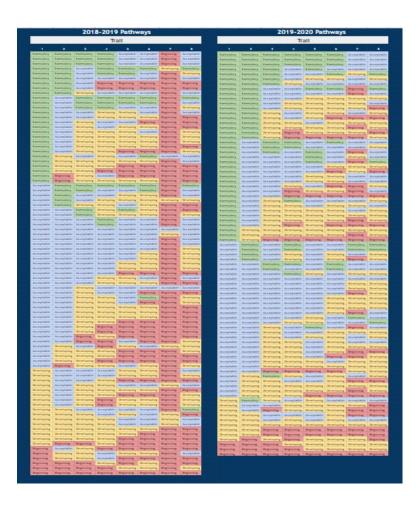


Figure 5. Top Panel. Heat map of year-over-year percent change in General Education Student Learning Outcomes assessment documents scored at each level for all traits. Red indicates a decrease. Green indicates an increase. Color saturation is representative of change magnitude. Note. Due to rounding, percent changes may not sum to 0%. Bottom Panel. Heat map of individual general education course assessment document trait scores (Beginning = red, Developing = yellow, Acceptable = blue, Exemplary = green) for 2018-2019 (bottom left) and 2019-2020 (bottom right) sequentially sorted by subsequent level and trait.

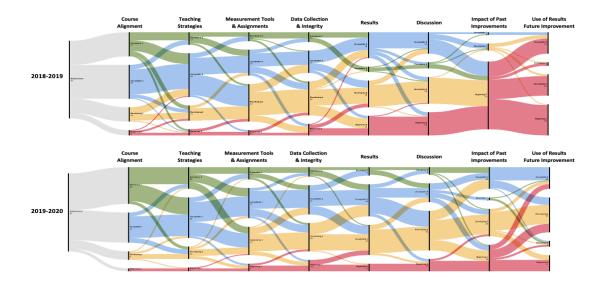


Figure 6. Alluvial visualization of 2018-2019 (top panel) and 2019-2020 (bottom panel) general education student learning outcomes assessment data through the four levels of the rubric's 8 traits. Numbers reflect counts. Colors reflect levels: Beginning (red), Developing (yellow), Acceptable (blue), and Exemplary (green).

#### Interpretations, Insights, and Actions

As these visualizations illustrate, assessment is an ongoing and evolving process in which stages are interdependent. Starting with a solid mission statement and clear, measurable student learning outcomes is an essential foundation for an assessment cycle that yields meaningful insights for improvement of student learning. For this reason, we adapted professional development training and resources for faculty following a more process-based approach with a focus on asynchronous accessibility. We developed student learning assessment handbooks with annotated examples of each stage of the assessment process, including practical tips for effectively documenting the process. We also leveraged existing campus technology, including our learning management system (LMS), library resource guides, and videoconferencing, to offer asynchronous and hybrid reference guides, mini-courses and workshops to support assessment coordinators and faculty serving on peer-review committees. Initial internal assessment has shown positive impacts on faculty knowledge of assessment best practices and confidence in abilities relevant to leading assessment activities, as well as improvement on peer-review scores of assessment documents for those who have participated in process-focused professional development workshops.

Ultimately, our visualization strategies provided us with a wealth of information from which to gain actionable insights about our assessment process while providing a mechanism by which to continuously ask additional and nuanced questions about improvement. We will continue to leverage these visualization strategies to assist us in identifying the most challenging aspects of our assessment process, illuminating the best predictors of overall assessment cycle success, and informing the development of targeted professional development resources while simultaneously informing and improving the ability of our office to fulfill its core mission of institutional support and leadership.

# **Author Note**

Portions of this paper were presented at the Indiana University-Purdue University Indianapolis (IUPUI) 2021 Assessment Institute. We would like to express our deepest appreciation and gratitude for the significant time and effort of faculty, assessment coordinators, and members of the university-level committees in our university assessment processes and for their critical roles in enhancing student learning and improving student learning outcomes assessment at Georgia Southern.

#### References

Bojanowski, B. (2016, September 9). Creating alluvial diagrams. https://cran.r-project.org/web/packages/alluvial/vignettes/alluvial.html

Gaudino-Goering, E. (2021, February). *Using a heat map to visualize academic assessment across the college*. Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment.

Georgia Southern University (2020). 2020-2021 Georgia Southern Factbook. https:// em.georgiasouthern.edu/ir/wp-content/uploads/sites/5/FB\_2020-21.pdf

Georgia Southern University (n.d.) Academic Program Students Learning Outcomes Assessment Rubric. Retrieved from https://drive.google.com/file/d/11yf7C7fpXyWkbZWpCmm8QPJ4VuIYd5Ki/

Georgia Southern University (n.d.) General Education Student Learning Outcomes Assessment Rubric. Retrieved from https://drive.google.com/file/d/1cS-8A1MS4ywevk\_aTfAfAmPn7iMT2muM/

Google. (n.d.). Sankey diagram. Retrieved from https://developers.google.com/chart/interactive/ docs/gallery/sankey

Heslin, J. (2017, August 9). Sankey diagrams: Six tools for visualizing flow data. Azavea. https://www.azavea.com/blog/2017/08/09/six-sankey-diagram-tool/

OriginLab (n.d). 28.9.25 Alluvial Diagrams. Retrieved from https://www.originlab.com/doc/Origin-Help/Alluvial-Diagram

Peterson, B. (2020, May 2). Alluvial pots vs Sankey diagrams. Datasmith.org. http://www.datasmith.org/2020/05/02/alluvial-plots-vs-sankey-diagrams/



#### **Please Cite As:**

Sturz, B., O'Connor, J., & Gatch, D. B. (2021, November). *Data pathways: Innovative approaches to visualizing assessment results*. Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment.

#### **About NILOA**

- The National Institute for Learning Outcomes Assessment (NILOA) was established in December 2008, and is co-located at the University of Illinois and Indiana University.
- The NILOA website contains free assessment resources and can be found at http://www.learningoutcomesassessment.org.
- The NILOA research team has scanned institutional websites, surveyed chief academic officers, and commissioned a series of occasional papers.

## **NILOA Staff & Fellows**

Gianina Baker, Acting Director Erick Montenegro, NILOA Fellow Verna F. Orr, NILOA Fellow Nan Travers, NILOA Fellow

#### **NILOA Senior Scholars**

Peter Ewell, Senior Scholar Pat Hutchings, Senior Scholar Jillian Kinzie, Senior Scholar George Kuh, Founding Director, Senior Scholar Paul Lingenfelter, Senior Scholar David Marshall, Senior Scholar

#### **NILOA Sponsors**

Lumina Foundation for Education University of Illinois, College of Education Sign up to receive our monthly NILOA Newsletter and stay up to date with our research and publications.







Follow us on social media:





@LearningOutcomesAssessment