Abstract

One of the important topics in assessment and institutional effectiveness research is the validation of assessment measures and instruments to evaluate students' learning outcomes. Using a university-wide initiative of Writing across the Curriculum as an example, this paper provides the step-by-step guidance of the mixed-methods exploratory sequential strategy in designing and validating a survey to assess one of students' learning outcomes—process writing. To generate preliminary survey items, the study started with focus groups with students, followed by content review by faculty members and writing experts. The survey was then piloted with a small sample of students, revised, and finally used with a larger sample size of students in the field. By elaborating on the steps of the mixed-methods approach in survey development, the study provides energy into the mission of accurately evaluating academic excellence and student learning in institutional research and practices.

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Survey Development in Assessing Student Learning Outcomes: A Mixed-methods Approach

In recent years, higher education evaluation and assessment in the United States and around the world has given much attention to the use of appropriate measures in assessing student learning outcomes (SLOs) so that results based on those measures are reliable and valid (e.g., Al-Thani, Abdelmoneim, Daoud, Cherif, & Moukarzel, 2014; Ewell, 2001; NEASC, 2016; SACSCOC, 2012). As such, developing an assessment tool with reliability and validity evidence is important, particularly in university-level assessment because such assessment often involves a large number of stakeholders and aims at assessing complex, multifaceted SLOs across multiple years. Validation of instruments to evaluate SLOs has become an eminent topic in institutional research (Meyer & Zhu, 2013). Researchers in higher education have called for well-designed methodologies and approaches to examine SLOs and program outcomes (McLeod, 1992).

The purpose of this project, which included a series of studies, was to develop a reliable and valid assessment tool that would be used to investigate one of the SLOs, students' engagement in process writing. Using a university-wide initiative of Writing across the Curriculum (WAC) as an example, this paper describes the mixed-methods exploratory sequential strategy in designing and validating the survey to investigate students' writing processes. WAC is considered a high-impact educational practice (Kuh, 2008). It has been identified as the focus of Quality Enhancement Plans (QEP) in many institutions including this research context—a public, comprehensive university with more than 20,000 students within the university system of Georgia. WAC was selected for our QEP based on the data-driven needs assessment results collected from a wide population of students, faculty, staff, and alumni. Participating undergraduate programs designated a sophomore, junior, and senior-level course within their disciplines as their WAC courses. In addition to the first institutional-level SLO, "demonstrating argumentation, analysis, and synthesis skills through writing in a variety of contexts" (Georgia Southern University, 2015, p.3), the second SLO highlights students' engagement in the processes of writing including researching, drafting, revising, editing, collaborating, and reflecting (Georgia Southern University, 2015).

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Although process writing has been considered to be an important aspect of enhancing writing (Balgopal & Wallace, 2013; Flower, 1994), a majority of studies generally attempted to examine process writing with school-aged populations (MacArthur, Graham, & Fitzgerald, 2006). Middle school or high school students were asked to think about their processes in writing essays and they were interviewed about their writing experience (e.g., Myhill & Jones, 2007). We have been unable to identify the existence of any survey of process writing appropriate for the university setting that demonstrated reliability and validity evidence. A systematic approach to the evaluation of process writing is warranted.

As such, this project aimed to design an assessment tool with reliability and validity evidence using the mixed-methods approach. The mixed-methods approach has long been adopted in the field of measurement to construct quantitative instruments grounded in the experiences of participants (Creswell & Plano Clark, 2011). However, this approach that helps to produce rigorous tools to appropriately assess SLOs is under-researched in institutional assessment. Although the mixed-methods design has long been used to create psychometric instruments (Creswell, 2002; Hinkin, 1998), limited practical guidance is available for designing robust and rigorous surveys in an institutional context. An appropriately designed questionnaire may help to define constructs that are often multidimensional, investigate changes over time, shed light on subgroup differences, explain relationships among sets of variables, and provide in-depth information on components needing attention. Further work is needed to explicitly describe the ways of optimizing the development of instruments by using mixed-methods approaches (Onwuegbuzie, Bustamante, & Nelson, 2010). Therefore, this paper reviews the literature related to process writing and provides a step-by-step description of the mixed-methods, exploratory approach to developing the process writing survey to assess the specific SLO defined in our university initiative.

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Students' Engagement in Process Writing

Since the 1980s, writing pedagogy has expanded from solely teaching students to concentrate on their written product to consider writing processes (Hillocks, 1986; Cumming, 1998). A review of the literature indicates that process writing evolved from a traditional, cognitive approach to a broader approach including metacognition, and to the more complex social-cognitive approach that is widely accepted today. While traditional models usually consisted of distinct steps to be followed in writing, theories in the 1980s (e.g., the Cognitive Process theory of writing by Flower & Hayes, 1980; 1981) shifted from the traditional linear sequence models to the recursive nature of writing processes. Writing was perceived to be a recursive process in which writers had the opportunity to plan, draft, edit, and revise their work. Flower and Hayes suggested four major cognitive writing processes—planning, translating, reviewing, and monitoring. Planning helps to organize ideas and brainstorm; translating takes the conceptual plan and generates texts; reviewing asks the writer to refine the text and revise content; and monitoring includes metacognitive activities of each stage and coordinates planning, translating, and reviewing. More recently, writing has been highlighted as an active, constructive, collaborative process (Flower, 1994). Flower's framework of the social-cognitive view of the writing process focuses on acts of negotiation and the insights from students' reflections, in addition to students' interpretation of tasks, feedback, and situations. Overall, current conceptualizations view writing as a constructive and contextualized process and emphasize the impact of interactions among the contextual factors on the cognitive processes of writers. The theoretical concepts of cognitive, metacognitive, and social strategies used in writing processes provide important foundations to define process writing.

Specifically, this project focused on six components of process writing for our QEP SLOs: researching, drafting, revising, editing, collaborating, and reflecting. First, the literature shows that researching, or information literacy, provides students an opportunity to reveal their understanding and interpretation of the topic by reviewing, evaluating, summarizing, or synthesizing sources (Lupton, 2004). Given the interdisciplinary nature of WAC, researching by seeking evidence can support literary interpretations, provide reasoning, present historical analyses, or identify literature gaps. Second, the literature finds that, based on the results of

researching, students begin to develop the structure of their paper by drafting, or prewriting, which includes creating concepts maps and outlines (Bahls, 2012). Drafting helps to plan out what is going to be written. Research indicates that skilled writers spend significant time organizing and planning what they are going to write (Hillocks, 1986). Students who spend little time researching and planning how to express their thoughts before writing them down may not adequately access sufficient information and ideas that could enhance the quality of their writings. The third component, revising, has a strong recursive nature. It allows students to consider their audience and continuously visit and revisit global problems of their work (e.g., argument and structure of large units of text; Bahls, 2012). This component allows writers to consider new ideas and thoughts and incorporate them into their writing. Research suggests that the process of revising helps writers to become more self-conscious and improves the quality of the final writing products (Desmet, Miller, Griffin, Balthazor, & Cummings, 2008). Fourth, editing offers opportunities to address issues in mechanics and format. Using a case study approach, Sommers (1980) found that novice writers typically revisit their writing by only fixing grammatical errors and spelling. The differences between expert and novice writers lay in the fact that experts spend significantly more time revising on global issues than novices. Fifth, as described by the social-cognitive view of the writing process (Flowers, 1994), when students draft, revise, and edit their work, students simultaneously collaborate with others. By collaborating, students review comments and feedback that they receive from others (Daniel, Gaze, & Braasch 2014; Woodrich & Fan 2017). Finally, students perform reflection, in which they consider potential changes to the draft and others' comments to develop strategies to incorporate them into a future draft (Yancey, 1998). Students reflect on feedback and determine whether the input supports their own ideas and those presented in the research they have read.

Overall, writing is a highly nonlinear activity in which writers, expert writers in particular, revisit literature and their work, often many times, over the various aspects discussed above. Although Flower's work and the social cognitive view of process writing have existed for decades, few if any questionnaires have been developed and validated to assess undergraduate students' writing process under the guidance of Flower's framework. To address this challenge, a mixed-methods, exploratory approach was used to develop a tool to investigate the SLO of process writing for institutional assessment. In addition to a step-by-step guidance, the goal of this study was to develop a preliminary set of items to capture the key components of process writing, refine the instrument, and gather preliminary validity evidence of the measure.

The key issue in survey design and development is to provide evidence of validity for intended uses

Validity and the mixed-methods exploratory approach

The key issue in survey design and development is to provide evidence of validity for intended uses. The contemporary perspective views validity as a multifaceted construct seeking out multiple sources of evidence, including traditionally emphasized concepts such as content, concurrent, and predictive validity (Messick, 1989; Kane, 2006). The most recent version of the AERA, APA, and NCME Standards (2014) states that an appropriate operational definition of the construct an instrument intends to measure should include a demonstration of validity evidence based on content, internal structures, response processes, and relations to other criteria. Validation is not an activity that occurs only when the survey is designed, but rather is an ongoing, dynamic process initiated at the design stage and continuing throughout development and implementation (Messick, 1989).

Thus, the mixed-methods exploratory technique has become more and more popular due to the ability to optimize survey development with validation processes (Onwuegbuzie et al., 2010). The approach consists of two sequential phases, first qualitative, then quantitative. It starts with the collection and analysis of qualitative data using various methods such as one-on-one interviews, focus groups, or direct observations to explore a phenomenon. Based on the qualitative results, researchers design and develop preliminary instrument items. The instrument's items will then be validated through a variety of forms of quantitative evidence such as reliability estimates and exploratory factor analysis. Generally speaking, the qualitative and quantitative methods are linked through the development of the survey items. In the exploratory approach, a greater emphasis is often placed on the qualitative data, which inform the development of

quantitative measures like Likert-form scale statements (Creswell, 2006). Creswell and Clark (2011) suggest that this approach is straightforward and easily "acceptable by quantitative-biased audiences" (p. 89).

In this project, focus group interviews with students were conducted first to generate preliminary survey items at the qualitative stage. The intention was to develop a bank of survey items that helped to identify a variety of students' activities and thinking processes representing manifestations of students' engagement in process writing. The qualitative stage also involved a group of faculty members from various disciplines to establish validity evidence in terms of its content. The faculty members conducted content analyses with the survey items in an iterative process after initial survey items were produced based on the qualitative interviewing results. Their perceptions were used to revise the instruction, content, interpretation, and wording of the survey. After that, in the second stage, the pilot study was conducted with a small sample to provide internal validity evidence of the survey. The process writing survey was finally revised for the field test with a larger sample size, and the results were reported.

The elaboration of the various steps of the mixed-methods procedure in this paper should inspire and inform other researchers to produce more solid, meaningful assessment tools

Using a mixed-methods design, this study aims to offer practical guidelines while creating a tool with validity evidence to assess process writing, which will provide a new resource for the core mission of appropriately assessing academic excellence and SLOs in an institutional context. The elaboration of the various steps of the mixed-methods procedure in this paper should inspire and inform other researchers to produce more solid, meaningful assessment tools that can be used to appropriately assess SLOs. In addition, this research helps to fill a void in the literature of the writing process by developing and validating a process writing measure.

Qualitative Stage: Focus Group

Participants

To generate preliminary survey items, 11 undergraduate students were recruited through the university public bulletin board at the library. Two focus group interviews, with one composed of three and another of eight, were conducted. The focus group participants were recruited using a purposeful sampling technique based on the QEP focus with middle- or upper-level students and their availability. Among the 11 participants, there were three sophomores, two juniors, and six seniors. Six males and five females came from a variety of academic backgrounds including general studies, political science, education, business, chemistry, nutrition and food science, nursing, English, electrical engineering, information technology, and public relations. The participants were representative of the wider undergraduate student population in terms of year of study, gender, and academic background.

Instruments

The semistructured interview protocol was designed and centered by the six components of process writing, which was identified by the QEP university committee (see Appendix A). The interview protocol essentially included two sections: the warm up question about their writing assignments (Q1) and six open-ended questions which were consistent with the six aspects of process writing (Q2-Q7). The interviews also provided the participants with opportunities to express their experiences and perceptions regarding the writing process based on their experience and reflections (Q8).

Data Collection and Analyses

The focus group interviews were conducted in January 2015. Prior to the interview, the participants were introduced to the purpose of the interview and told their participation was completely voluntary. Signed consent forms were collected after the introduction. The interviews ranged about 30–60 minutes and were voice-recorded, transcribed, and analyzed using Nvivo 9. Using the deductive coding technique (Crabtree & Miller, 1999), the initial list of themes was identified based on the six components of process writing. We then defined and modified the meaning of those themes within the process of the analysis.

Results

Through focus group interviewing with undergraduate students from different academic backgrounds, qualitative data were collected and analyzed to provide preliminary information regarding each component of process writing. Specific definitions emerged from the focus group interviews (see Table 1). The descriptions of those themes were used to form the basis of the survey constructs.

Table 1
Qualitative Themes

Theme	Descriptions
Researching	Students' behaviors to locate, read, evaluate, and cite information related to topics of writing assignments
Prewriting/drafting	Students' behaviors to organize and plan what will be written
Revising	Students' behaviors to consider audience and address global problems including clarity, reasoning, logic, audience, and flow of ideas
Editing	Students' behaviors to address mechanical, sentence structure, and format issues
Collaborating	Students' behaviors to work with other people to improve the quality of their writing assignments
Reflecting	Students' reflection on feedback and thoughts about the appropriateness and meaningfulness of feedback

Based on the interview results, previous literature, and the SLO surveys used at Georgia Southern University (e.g., ENGL 1101/1102), initial items were designed to be used and perceived as meaningful and relevant in this setting. The survey items were written in the present tense in first person narrative form to encourage participants to think about their general usage. Each item was worded in simple language to ensure the strategies were clear to participants and to avoid confusion. The survey included 21 items that examined six components of the SLO. Table 2 presents three examples of qualitative data transformed into specific survey items.

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Qualitative Stage: Content Analysis

Participants

To further provide validity evidence regarding the survey content, the survey draft was presented to the QEP development committee and four experts from various disciplinary areas including nursing, journalism, English, and education. All members in the QEP development committee were invited to provide comments either collectively or individually. The development committee, 16 in total, had broad representation of faculty from each college, students, administrators, and staff (e.g., librarians). The committee members were familiar with the contextualized teaching and/or learning environment as well as the nature of the QEP outcomes.

Instrument

The survey, which included 21 items that examined the six aspects of process writing, used a 1–6 rating scale where 1 = "Never true of me" 2 = "rarely true of me (about 20% of the time)," 3 = "sometimes true of me (about 40% of the time)," 4 = "often true of me (about 60% of the time)," 5 = "usually true of me (about 80% of the time), and 6 = "always true of me." Participants were asked to evaluate the survey for redundancy, clarity, and readability of items and for suggestions or input on additional strategies. In particular, the development committee was invited to draw special attention to three aspects of the survey: 1) content—how each item measured what the QEP intended students to be able to be engaged in process writing, 2) appropriate wording to avoid misinterpretations, and 3) format and user-friendliness. This stage ensured the clarity of the survey and determined if any adjustments were required for wording or conceptual problems.

Table 2
Creating Survey Items from Interviewing Data

Interviewing data	Theme	Survey item
"I am usually using textbook that the professors require or maybe outside source. Galileo system, with the USG system, is really helpful"	Researching	To prepare for writing, I search scholarly resources such as Galileo and narrow searches to find credible and relevant information.
"First of all, if it's about rearranging sentences, changing words, or using a better word, that is just kind of 'I agree' 'I will go with that'… so a lot of times, if I get something where a person's question is about content itself, then there is a lot more of kind of reflection on that piece, and trying to clarify. How can I get my point across, but understand that they are not getting it right now? How can I make it clear?"	Reflecting	I read and review the comments that I received to see if they sound right or if they make sense to me.
"I come from a family of teachers. My mom usually helps me with ideas. Get feedback from them. They are really supportive of it."	Collaborating	I seek feedback and comments from instructors, peers [e.g., classmates, lab mates, roommates, friends or family members on my draft(s)].

Survey items were revised several times in an iterative process based on input and feedback from the QEP committees and other experts

Results

Survey items were revised several times in an iterative process based on input and feedback from the QEP committees and other experts. This process was intended to produce preliminary survey items to be used at the institutional level for the pilot study. Based on the comments, 21 items were developed. Special care was taken to ensure that each item only reflected one type of question to avoid the use of double-barreled items. Table 3 presents examples of the revised items.

Table 3
Revising Survey Items

Original item	Concern	Revised item
To prepare for writing, I highlight important sections, bullet point the key issues, take notes in my reading, or write annotated bibliography.	Annotated bibliography can be one type of writing assignment.	To prepare for writing, I highlight important sections, bullet point the key issues, or take notes in my reading.
Before I start writing, I think about the key points and visualize a concept map.	Students may not understand the meaning.	Before I start writing, I think about the key points and visualize their order or relationships.
I read my writing carefully to make sure there are no errors in citations.	Changing to a strong verb	I read my writing carefully to eliminate errors in citations.
I go to the library, the Writing Center, or Academic Success Center to get help on my writing.	Changing from a general to specific word	I go to the library, the Writing Center, or Academic Success Center to get guidance on my writing.

Quantitative Stage: Pilot Study

Participants

After survey items were created and revised, the survey was piloted with eight intact classes, a total of 277 undergraduate students with various academic backgrounds including engineering, biology, psychology, international trade, and English. Four responses with missing values exceeding 10% of the total number of 21 process writing items were removed from the database. Among the 273 valid responses, 82 came from College of Engineering and Information Technology, 64 College of Liberal Arts and Social Sciences, 44 from College of Business Administration, 5 from College of Education, 2 from College of Public Health, 36 from College of Science and Mathematics, and 37 from College of Health and Human Sciences. Three students did not report their majors. One hundred forty-five were males, 126 were females, and two did not indicate their genders. In addition, there were 24 freshmen, 117 sophomores, 73 juniors, and 59 seniors.

Data Collection and Analysis

Instructors who taught in this university were contacted through personal connections. They were invited to help with data collection, either by distributing the survey in their class or allowing the researcher to go to their class to distribute the survey. Students were informed that under no circumstances would their answers for the survey be released to anyone else but the researcher. Students were told that their frame of reference for responding to the survey statements should be their engagement in process writing in general, rather than any particular type of assignment.

In order to provide the reliability and validity evidence of the process writing survey, a series of data analyses were computed, including descriptive statistics, reliability estimates, and exploratory factor analysis. Item-level descriptive statistics were calculated first to determine how the participants in the pilot study reported their engagement in process writing. Normality of the survey was examined because it is an early step in factor analysis. A nonnormal distribution of the items could degrade the correlations among variables and consequently weaken factor analysis. Reliability estimates were also calculated to investigate the homogeneity of subscales because it is a prerequisite for subsequent factor analysis. As exploratory factor analysis is a common way in the early stages of scale development for data reduction (Kelloway, 1995), it was used to determine the items that load best on each factor. The sample size met the minimum recommended requirement, item ratio of 10 to 1, for obtaining stable factor solutions (Burton & Mazerolle, 2011).

The reliability estimates of most of the subscales were above .60, except the subscale of researching (α = .48), which is somewhat low

Results

The means of the 21 items ranged from 2.5 to 4.92 and the standard deviations from 1.05 to 1.52. All skewness and kurtosis values ranged between +1 and -1, except one (Researching 3), and all were within the accepted limits (+ 2), indicating that the responses for individual items seemed to be normally distributed. Therefore, all the survey items were kept for the subsequent analyses. Cronbach's alpha was computed to discover the level of internal consistency for the subscales of the survey. The reliability estimates of most of the subscales were above .60, except the subscale of researching (α = .48), which is somewhat low.

Table 4
Descriptive Statistics at the Components Level

	# of Items	N	M	SD	Skewness	Kurtosis	Reliability
Researching	4	272	4.34	0.81	-0.26	0.04	0.48
Drafting	3	273	4.29	1.10	-0.29	-0.35	0.78
Revising	4	273	3.59	1.10	0.11	-0.35	0.71
Editing	3	273	4.48	1.03	-0.52	0.13	0.63
Collaborating	4	273	3.48	1.21	-0.19	-0.52	0.84
Reflecting	3	273	4.72	1.03	-0.77	0.40	0.87

To understand how the 21 items clustered with their respective subscales, exploratory factor analysis was performed. The measure of Kaiser-Meyer-Olkin (KMO) and Bartlett's Test was .87, indicating the adequacy of the sample size. After that, four major issues were considered: (a) factor model (common factor analysis vs. components analysis), (b) rotation (orthogonal vs. oblique), (c) number of factors, and (d) interpretation (see the comprehensive review paper by Fabrigar, Wegener, MacCallum, & Strahan, 1999). In this pilot study, Maximum Likelihood and a Varimax solution were used because they maximized interpretations (see a review by Fabrigar et al., 1999). An examination of initial eigenvalues indicated that six factors had eigenvalues greater than 1.0. The scree plot also found the curve decreases and straightened out at the 6th point. Those six factors explained 67.9% of the variances. Considering the low reliability estimate of the subscale of researching, the four items under researching were removed each time because these items were unlikely to provide clear, meaningful information to explain the latent variables under investigation. The results after removing each of the research items were compared, but they still did not provide clearer patters. The rotated factor matrix was reported in Table 5, which included all the 21 items with loadings above .35. The goal in these analyses were to generate a set of discriminating items to be included in the final instrument.

13 of the 21 items loaded on the expected factors. Four Collaborating items loaded on factor 1, three Editing items on factor 2, three Drafting items on factor 3, and three Reflecting items on factor 4

Table 5
Exploratory Factor Analysis

	Factor					
	1	2	3	4	5	6
Researching1			0.39		0.36	
Researching2					0.64	
Researching3						0.73
Researching4			0.47			
Drafting1			0.71			
Drafting2			0.74			
Drafting3			0.67			
Revising1	0.36				0.41	
Revising2		0.45			0.43	
Revising3		0.71				
Revising4		0.46				
Editing1		0.61				
Editing2		0.81				
Editing3		0.38				
Collaborating1	0.70					
Collaborating2	0.81					
Collaborating3	0.84					
Collaborating4	0.55					
Reflecting1				0.65		
Reflecting2				0.84		
Reflecting3				0.81		

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 6 iterations.

As shown in Table 5, 13 of the 21 items loaded on the expected factors. Four Collaborating items loaded on factor 1, three Editing items on factor 2, three Drafting items on factor 3, and three Reflecting items on factor 4. However, four Researching items loaded on three factors and

three Revising items clustered together with Editing. Although the results provided sufficient evidence for internal consistency of the components and dimensionality of the survey, the items under Researching and Revising did not load the components as expected. As such, the items related to Researching and Revising were revisited while the other 13 items were retained in the process writing survey.

The items related to Researching and Revising were brought to a wide audience including faculty members (engineering, nursing, history, and journalism) and department chairs (communication arts and history). The four items regarding researching did not seem to measure Researching in a reliable and valid manner. Although researching was defined as "seeking evidence" (Lupton, 2004), the definition of "evidence" seems vary dramatically between different disciplines. While many papers contain descriptions of assignments by including a research component in graduate programs, no one has proposed a coherent definition for research that can be used in the context of undergraduate writing assignments. The conversations with faculty members from various disciplinary backgrounds found different definitions, experiences, and expectations toward researching. For example, the engineering faculty member found students mostly used Google while he expected students to use scholarly resources including Google Scholar for researching. Conversely, the faculty in journalism recognized the importance of using Google search to find background information related to human sources. Although the history faculty member recommended secondary resources such as journal articles, he generally found it impractical to use human sources for researching. For some areas, researching goes beyond information literacy. Researching indicates not only seeking empirical evidence, but also demonstrating data collection, analysis, and synthesis skills for theory or practical implications.

The four items that intended to measure Revising were also problematic. One possible reason may be due to the situation that students did not distinguish revising from editing during the process of their writing. They may check errors or inconsistencies only at the local level such as word choice, a missed word, or sentence structures. Students do not revise the paper as a whole, considering the strengths and weaknesses of arguments. Based on those comments, the items related to Researching and Revising were revised (see Table 6).

Quantitative Stage: Field Study

Participants

The survey (see Appendix B) was distributed in 36 classes. Eight hundred forty-one students submitted the survey and there were 785 valid responses. Among the valid responses, 256 were juniors (32.6%) and 523 were seniors (66.6%); 346 were males (44.1%) and 430 were females (54.8%). Students came from a variety of programs and colleges including the College of Engineering and Informational Technology (12.6%), Collage of Health and Human Sciences (20.4%), College of Education (5.9%), College of Business Administration (21%), College of Science and Mathematics (13%), College of Public Health (1.3%), and College of Liberal Arts and Social Sciences (25%). Seven participants did not specify their college affiliation.

The items related to Researching and Revising were brought to a wide audience including faculty members (engineering, nursing, history, and journalism) and department chairs (communication arts and history)

Data Collection and Analysis

Through the university system, instructors were invited to distribute the survey in their classes. Written instructions were provided to instructors to explain the purpose and structure of the survey and the approach to return the responded surveys. After that, a series of data analyses were computed, including descriptive statistics, reliability estimates, and exploratory factor analysis.

Results

All skewness and kurtosis values of the 21 items were within the acceptable limits (+ 2). Therefore, all the survey items were kept for the subsequent analyses. The process writing survey showed sufficient internal consistency evidence for the overall survey ($\alpha = .91$) and its six components (ranging from a low of .70 to a high of .85).

Table 6
Refining Survey Items

Revised survey item	Refined survey item
Researching 1: To prepare for writing, I try to collect as much relevant information as possible.	Researching 1: To prepare for writing, I use credible resources (e.g., GALILEO, Google Scholar, or books) to develop the topic or support the argument.
Researching 2: To prepare for writing, I search scholarly resources such as GALILEO and narrow searches to find credible and relevant information.	Researching 2: I read sources critically to see whether they are based on opinions, facts, or empirical evidence.
Researching 3: To prepare for writing, I search resources such as Google for information.	Researching 3: To prepare for writing, I keep track of the information of sources so I can cite them properly.
Researching 4: To prepare for writing, I highlight important information, bullet point key issues, or take notes in my reading.	
Revising 1: I write multiple versions for my assignment instead of finishing my paper in one sitting.	Revising 1: I write multiple versions for my assignment instead of finishing my paper in one sitting.
Revising 2: I reorganize what I write by moving around ideas, sentences, and/or paragraphs to make it more logical.	Revising 2: I reorganize what I write by moving around ideas, sentences, and/or paragraphs to make it more logical.
Revising 3: I check to see if sentences make sense together, add sentences to create better flow or connection, and/or make links between different parts of writing.	Revising 3: I write more than one draft in order to improve the overall structure of my writing assignment.
Revising 4: When writing I think about my readers and adjust the way I describe things or expressions.	Revising 4: I write more than one draft to clarify the points/ideas that I discuss in my writing assignment. Revising 5: I consider the audience of my writing assignment and adjust the way that I write.

It also filled a void in the literature by developing a set of Likert-scale questions to measure Flower's social-cognitive view of the writing process

In the field study, Principal Axis Factoring and a Varimax solution were used. An examination of initial eigenvalues indicated that six factors had eigenvalues greater than 1.0. The scree plot also found the curve decreases and straightened out at the 6th point. Those factors explained 70.3% of the variances. Rotate factor matrix was reported in Table 7. Revising was the component that accounted for the largest variance of process writing. The process writing survey showed validity evidence by examining the internal structure of the survey through Exploratory Factor analysis, except one item Audience Consideration under Revising—"I consider the audience of my writing assignment and adjust the way that I write." This item will need closer monitoring to see how the loading may change in the future.

Discussion

This research demonstrated how a mixed-methods approach helped to develop an assessment tool with reliability estimates and validity evidence so that students' engagement in the process writing could be appropriately investigated. It also filled a void in the literature by developing a set of Likert-scale questions to measure Flower's social-cognitive view of the writing process. Following the established mixed-methods survey development steps, four separate steps of research were used. The Qualitative Stage: Focus Group involved item generation and development. The Qualitative Stage: Content Analysis was to provide evidence

Table 7
Exploratory Factor Analysis

	Factor					
	1	2	3	4	5	6
Researching1						0.67
Researching2						0.63
Researching3						0.48
Drafting1					0.62	
Drafting2					0.78	
Drafting3					0.69	
Revising1	0.65					
Revising2	0.40					
Revising3	0.92					
Revising4	0.88					
Revising5	0.20	0.29	0.33	0.05	0.25	0.14
Editing1			0.82			
Editing2			0.85			
Editing3			0.52			
Collaborating1				0.65		
Collaborating2				0.75		
Collaborating3				0.76		
Collaborating4				0.41		
Reflecting1		0.66				
Reflecting2		0.83				
Reflecting3		0.70				

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 7 iterations.

The survey demonstrated evidence in terms of content validity (steps one and two), internal structure (steps three and four), and reliabilities above the recommended level for new scales (steps three and four)

related to content validity of survey items. The development and refinement of a content valid instrument was achieved by a rational analysis of the instrument by content experts who were familiar with the research context and subject. Those experts examined the questionnaire items for readability, clarity, and comprehensiveness and came to agreement about which items should be included in the questionnaire. This step enhanced collaboration, engagement, and buy-in among faculty members. The Quantitative Stage: Pilot Study provided information regarding internal structure. The construct of interest process writing had many dimensions which formed different domains of a general attribute, therefore, factor analysis was employed. In the analysis of internal structure, items that measured a particular dimension within a construct of interest were more highly related to one another than to those measuring other dimensions. While the pilot study tested the internal structure of 21 items, the Qualitative Stage: Field Study confirmed the six dimensions of the survey for all but one item, Audience Consideration. Overall, the survey demonstrated evidence in terms of content validity (steps one and two), internal structure (steps three and four), and reliabilities above the recommended level for new scales (steps three and four). Therefore, the study established empirical evidence of the appropriateness of the process writing survey guided by Flower's theory to be used in the current context.

Given the high relevance of survey development to this community, this work has important methodological implications and informs practical applications to address challenging questions in institutional assessment. First, the paper provides explicit information and step-by-

step guidance about enhancing the reliability and validity evidence of a survey assessing student learning. The information goes beyond a specific setting in designing a particular survey and provides practical, methodological guidance about the application of fundamental concepts in assessment (e.g., reliability and validity) in designing indirect measures and investigating SLOs. The mixed-methods exploratory approach can be a useful tool to investigate multidimensional constructs for institutional assessment. The qualitative stage is to conceptualize the construct of interest based on a thorough review of the literature and information provided by key informants and experts. The information is used to identify and describe behaviors that underlie the construct and develop initial instrument items. After that, the quantitative stage pilots the initial items and provides construct-related validity evidence. It helps to revise initial items through field testing those items. Second, the process writing survey may be used by other schools and institutions as a basis to be validated in their contexts and evaluate how students are engaged in writing processes when they write writing assignments. The survey can generate ideas for other contexts and help organizations to uncover potential problems and identify specific areas that need special attention. Finally, the process writing survey will allow for greater use of Flower's social-cognitive theory of process writing. Although the model has shown promise and been cited considerably in previous literature, the lack of direct measures of process writing from this model has limited its full application.

This current series of studies addresses a gap in process writing literature by describing how to design and develop a rigorous, meaningful scale to evaluate SLOs

Conclusion

Overall, the results provide information concerning internal consistency and construct validity of the components of process writing. The results show that process writing involves the specifics of the actual writing process encompassing cognitive, metacognitive, and social strategies. A single survey item, which is often used to examine student process writing, underestimates the complexity of process writing, and hence, does not provide an accurate estimate of the SLO. The mixed-methods approach in survey development, a relatively underutilized method, helps to produce tools with reliability and validity evidence that can be used to appropriately assess SLOs in institutional assessment. This current series of studies addresses a gap in process writing literature by describing how to design and develop a rigorous, meaningful scale to evaluate SLOs.

Although the project provided step-by-step guidance on how to use the mixed-methods approach to develop a survey, there are several limitations and more research is needed to further refine and validate the process writing survey using more complicated methodologies. The possible limitations of the sampling strategy and use of focus groups should be noted. Future research may test the revised survey using confirmatory factor analysis. Different from exploratory factor analysis that was used in the quantitative stage in this project, confirmatory factor analysis tests a theory (e.g., Flower's social cognitive theory) between overserved variables (survey items) and their underlying, latent variables. Future studies also need to demonstrate convergent validity and divergent validity. Such validity evidence can be established based on a predictable pattern of relationships with other variables such as students' writing products or attitudes. Research may also consider using Item Response Theory to measure the relevance and difficulty of survey item content, evaluate appropriateness of response categories, and examine item redundancy. In addition, Onwuegbuzie and his collaborators (2010) strongly recommend including open-ended, qualitatively-based items with quantitative instruments. They affirm the importance of involving "a comprehensive evaluation both of the product and the process" (p. 67).

On the whole, the process writing survey that was constructed within the current context needs to be validated if used in other contexts. Future research also needs to examine the nature of audience consideration. Another concern of this project revolved around the question whether those mental and behavioral processes can be validly elicited by merely a self-reported questionnaire. Multiple data collection methods, such as using retrospective think-aloud protocol, are recommended in investigating the use of process writing in specific contexts.

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Appendix A: Structured Interview Protocol

1. Warm-up question: Can you introduce yourself? Can you tell me the recent writing assignment you have done or you are still working on? It might be a lab report, essay, summary, or short-answer question.
2. In the following, we are going to reflect on the steps or actions that you took in your writing assignment. Before you began to write, how did you do research and get yourself prepared?
3. How did you draft? How did you spend time making an outline or drafting the structure?
4. How did you revise your writing assignment? How did you reorder, delete or add new material? If so, how much and why?
5. How did you edit your writing? Before you submitted your writing, how did you go through the whole paper to proofread and check grammar and spelling?
6. What social supports did you use for writing? How did you discuss ideas with others such as instructors, librarians, or tutors at the writing center?
7. How did you reflect on your writing? How did you reflect on responses which were given after peer review?
8. Do you have any additional comments that you would like to share with us?

Appendix B: Process Writing Survey

1. To prepare for writing, I use credible resources (e.g., GALILEO, Google Scholar, or books) to develop the topic or support the argument.
2. I read sources critically to see whether they are based on opinions, facts, or empirical evidence.
3. To prepare for writing, I keep track of the information of sources so I can cite them properly.
4. Before I start writing, I think about key points and visualize their order/relationships.
5. I spend time brainstorming and creating a web of ideas in my mind.
6. I develop and group ideas, list supporting arguments, and/or identify pros and cons.
7. I write multiple versions for my assignment instead of finishing my paper in one sitting.
8. I reorganize what I write by moving around ideas, sentences, and/or paragraphs to make it more logical.
9. I write more than one draft in order to improve the overall structure of my writing assignment.
10. I write more than one draft to clarify the points/ideas that I discuss in my writing assignment.
11. I consider the audience of my writing assignment and adjust the way that I write.
12. Before I turn in my writing, I go through my whole paper to check my word usage, grammar, punctuation, and spelling.
13. I edit my writing assignment carefully to ensure proper word choice.
14. I edit my writing assignment by following the disciplinary style guide (e.g., APA, MLA, Chicago, or specific disciplinary writing format).
15. I seek feedback and comments from instructors, peers (e.g., classmates, lab mates, roommates, and friends), or family members on my draft(s).
16. I talk with instructors, peers, or family members about my thoughts on my assignment to get outsiders' views.
17. When writing an assignment, I consult my instructors, peers, or family members for assistance or directions.
18. I go to the library, the Writing Center, or Academic Success Center for guidance on my writing.
19. I reflect on the feedback I received from instructors, peers (e.g., classmates, lab mates, roommates, and friends), and/or family members on my draft(s).
20. I read and review the comments that I received to see if they sound right or if they make sense to me.
21. I try to figure out whether the comments I received fit in the flow of my paper/writing or into the big picture in my writing.

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