

2015

## Q Methodology as a Tool for Program Assessment

Susan E. Ramlo  
*The University of Akron*

Follow this and additional works at: <https://scholarworks.bgsu.edu/mwer>

[How does access to this work benefit you? Let us know!](#)

---

### Recommended Citation

Ramlo, Susan E. (2015) "Q Methodology as a Tool for Program Assessment," *Mid-Western Educational Researcher*. Vol. 27: Iss. 3, Article 3.

Available at: <https://scholarworks.bgsu.edu/mwer/vol27/iss3/3>

This Featured Article is brought to you for free and open access by the Journals at ScholarWorks@BGSU. It has been accepted for inclusion in Mid-Western Educational Researcher by an authorized editor of ScholarWorks@BGSU.

## Q Methodology as a Tool for Program Assessment

*Susan E. Ramlo*  
The University of Akron

*Program assessment is now commonplace at most colleges and universities and is required for accreditation of specific degree programs. Key aspects of program assessment include program improvement, improved student learning, and adequate student preparation for the workforce. Thus, program assessment is a key ingredient to program health. Although surveys are often used within program assessment in higher education, this study demonstrates the weaknesses of this method and, instead, introduces Q methodology as a means of program assessment especially in the area of needs assessment. In essence, Q offers an objective way to measure subjectivity about any topic. Unlike Likert-scale surveys, Q is a mixed method that reveals the multiple unique views as well as consensus within the group of participants. In this study, Q was used to determine views of a construction engineering technology program. How the results will be used to improve the program is presented.*

In higher education, there is an increasing focus on program assessment. Essentially, program assessment is about program improvement and enhanced student learning. Program assessment involves examining how the program impacts students and how well program goals are met. To accomplish this, faculty are asked to demonstrate that their programs benefit students and prepare them for the workforce (Gardiner, Corbitt, & Adams, 2010; Martell & Calderon, 2005; McNeil, Newman, & Steinhauser, 2005). As a result of the program assessment, programs make adjustments to better meet goals. Program assessment leads to informed decision making, which is a key ingredient to program health and program capabilities to meet the needs of stakeholders, including students (Jorgensen, 2008; McNeil et al., 2005). In this way, these assessments are a meaningful effort and not simply an attempt at appeasing the institutions' administration for performing program assessment, which is necessary for their institutional accreditation and often used to determine continuation and funding of programs based on student learning and success (Dunlap, 2008; Jorgensen, 2008). The purpose of this program assessment of an engineering technology program was to examine students' views about the program's strengths and weaknesses in order to develop a plan of continuous improvement as mandated by the program's accrediting agency as well as the university. In this paper, I specifically look at what the data reveals about student perspectives about the engineering technology program and compare those views to the program's lead faculty member's view. Finally, I examine the benefits of applying Q methodology to complete this task.

### Program Assessment at the University

Compliance with the accreditation standards of the Higher Learning Commission is certainly one of the reasons for the increased focus on program assessment at universities

and colleges. Program assessment typically consists of a systematic collection of information about student learning based upon student learning outcomes at the course and/or academic program level. Although some may focus on seeking accreditation at the college or program level, all program assessment should use results to better inform decisions about how to improve learning.

At my university, program assessment has been an ongoing process since about 2004. This process is mainly at the program level and is directed by faculty with oversight provided by our Institute for Teaching and Learning. In the recent past, I provided program assessment for the nine engineering technology programs within my department from 2004 until 2013. Because of the variety of programs and the differing knowledge of program faculty about assessment, directing program assessment even at the department level can be challenging. In addition, opinions about faculty's programs and those of other programs within the department are varied and sometimes contentious. This is also true of students' opinions about their academic programs.

A typical response would be to use a Likert-scale survey to gather information from students. However, McKeown (2001) discusses how the use of Likert-scale surveys results in a loss of meaning. He suggests that Q methodology offers a solution to this problem by providing descriptive results for each perspective that emerges.

Additionally, Brown (1980) provides a description related to the conundrum of Likert-scale meaning. I have adapted it for program assessment for demonstration purposes here. Two people who respond in the same way to the same questionnaire item may actually mean different things, or that two people responding differently may actually mean the same thing. For example, looking at the following prompt, "This program effectively prepares students for careers in this field." Student-1, who responds *agree strongly*, may not necessarily be stronger in his agreement than Student-2 who checks *moderately agree*. Their frames of reference may differ in a way such that in reality Student-2 holds stronger opinions than Student-1. But if Student-1 says he prefers bicycle riding (A) to baseball (B), we can be relatively more certain that  $A > B$  because of the common frame of reference involved. This common frame of reference is, in part, what the Q-sort, the means of collecting participant data, provides within Q methodology.

Certainly surveys are commonly used for program assessment (Gardiner et al., 2010; Martell & Calderon, 2005), Q methodology was used as an alternative here to determine the various views held by students about their program of study in engineering technology and to compare those views to faculty views of these programs. The qualitative-quantitative aspects of Q methodology represent a continuum and provide advantages associated with using mixed methods to answer research questions that are not present in other methods including Likert-scale surveys (Newman & Ramlo, 2010; Ramlo & Newman, 2011).

### Q Methodology

In Q methodology, the statistical analyses provide Q factors. The Q factors denote qualitative differences in perspective (Brown, 1980) and in this way the individual statement positions help describe a kind of “world view” for each perspective. Ramlo and Newman (2010) detailed how Q methodology can effectively be used for program evaluation. The reasons provided by these researchers supported the choice of Q methodology to perform a program assessment that investigated student perceptions of an engineering technology program. Q provides descriptive profiles while also differentiating the unique perspectives. In addition, Q reveals consensus and preserves the meaning of the participants as they reveal their perspectives via the Q-sort. In this way, Q best fits the purpose of the study to reveal the stakeholder perspectives of the engineering technology program in ways that would be most meaningful for program assessment purposes.

Q methodology was created to study subjectivity (Brown, 1980; Stephenson, 1953). This mixed method shares many of the focuses of qualitative research while utilizing the type of statistical analyses typically found in quantitative studies (Newman & Ramlo, 2010; Ramlo & Newman, 2011). As Stainton-Rogers (1995) explains, compared to typical qualitative research, Q methodology maintains the relationship among themes within the data as it minimizes the impact of the researcher’s frame of reference. It minimizes this impact through complex statistical analysis including correlation and factor analysis. Despite its ability to determine the differing perspectives and consensus within a group, Q methodology is relatively uncommon in behavioral and social science research (Brown, 1980; Newman & Ramlo, 2010, Stephenson, 1953).

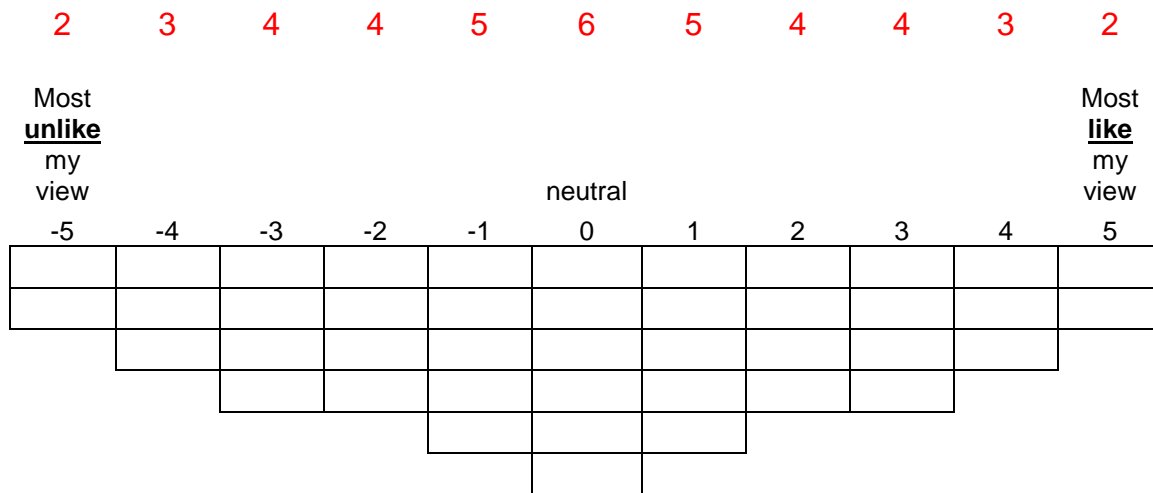
Q methodology is currently celebrating its 80<sup>th</sup> year of existence; 80 years ago Stephenson first published an article describing Q methodology in *Nature* (Stephenson, 1935). As Brown (2010) stresses, Stephenson offered differentiation among some common Q terminology. Q technique refers to the data-gathering procedure (Q sort); Q method refers to the analytic process (factor analysis and interpretation); and methodology denoted the conceptual and philosophical framework. Specifically, Q methodology is a set of procedures, theory, and philosophy that focuses on the study of subjectivity, where subjectivity is typically associated with qualitative research and objectivity is usually associated with quantitative research (Brown, 2008; Stenner & Stainton-Rogers, 2004).

The Q factors (views) denote qualitative differences in perspective. This interplay between qualitative and quantitative throughout this methodology represents the reason others have designated Q as a mixed method (Newman & Ramlo, 2010; Ramlo & Newman, 2011; Stenner & Stainton-Rogers, 2004). Other publications have described Q methodology in detail (Brown, 1980, 2010; McKeown & Thomas, 1988; Newman & Ramlo, 2010; Stephenson, 1953). I will give an overview of the methodology here within the context of this particular study.

### Developing Concourse for the Program Assessment

Any Q methodology study commences with the development of the concourse which is a collection of items, typically statements, about the topic that have been collected by the researcher (McKeown & Thomas, 1988). For this program assessment, the concourse was developed from a variety of sources. First, each engineering technology program within the department has a strategic plan and program learning outcomes. Next, most of the programs are accredited by the Technology Accreditation Commission (TAC) of ABET and must meet certain criteria. Data for accreditation includes self-studies, alumni surveys, and a collection of student learning assessments. These materials were used to provide statements for the concourse. In addition, I performed informal interviews with faculty and students to collect views about programs that may not be part of strategic plans or self-studies. The concourse items were sent out to faculty for feedback and several other statements were added to the concourse. This feedback was also used to help select the 48 statements for the Q-sample which is a subset of the concourse that represents the communications on the topic. Faculty and students sorted the Q-sample based upon their view of their engineering technology program.

Figure 1. Sorting grid for this study



### Sorting of the Q sample

Participants sorted the 48-item Q-sample into a grid provided by the researcher and displayed in Figure 1. The condition of instruction was for sorters to arrange the items based upon their views of their engineering technology program major. Faculty provided sorts and asked students within capstone courses to provide sorts. In most cases, classroom time was given for the student sorting. Only the results for the Construction Engineering Technology program, which consists of an Associate Degree and a Bachelor Degree, are provided within this manuscript.

### Analyses

Thirty-five participants from the Construction Engineering Technology (CET) program sorted the 48 statements from the Q-sample. These statements are provided in Table 1 along with results of the analyses which will be described in a subsequent section of this paper. The study's participants consisted of one faculty member, 19 bachelor degree students, and 15 students in the associate degree CET program. The initial analysis of the Q sorts is essentially a correlation using factor analysis. A factor matrix is created and participants are flagged when associated with a specific factor. Participants are identified on one factor based on the factor loadings. Only those participant Q-sorts identified with a factor are used to describe that factor in subsequent analyses.

### Results

Three distinct views (factors) emerged from the factor analysis. Factor 3 includes the lead-faculty person in addition to five Bachelor (BS) degree students and six Associate (AAS) degree students. Two of these BS students have negative Factor 3 scores. This means that these two students are negatively correlated with this view/factor.

Factor 1 consists of 11 students – seven at the BS level and four at the AAS level. Six student views are represented by Factor 2 with two BS students and four AAS students. These students all have positive factor scores on their representative factor. Note that all of the students except one are male; the female student is an AAS student represented by the Factor 3 view along with the faculty member who is also a female.

Table 1

*Those statements that distinguish Factor 1 from the other factors*

No.	Statement	Factor 1 Grid Position	Factor 2 Grid Position	Factor 3 Grid Position
1 <sup>^</sup>	This program provides students a quality education.	3	2	4
2	This program effectively prepares students for careers in this field.	0*	3	2
3	This program teaches students how to be problem solvers within the context of this field.	-1	1*	-2
4	Instructors within this program do all they can to enhance students' learning.	2*	0*	4*

*(continued)*

Table 1 (continued)

*Those statements that distinguish Factor 1 from the other factors*

No.	Statement	Factor 1 Grid Position	Factor 2 Grid Position	Factor 3 Grid Position
5	Most instructors outside of this specific program provide an environment that fosters student learning.	-3	-3	1*
6 <sup>^</sup>	This program provides students with the skills to continue learning after they have graduated.	2	3	2
7	This program provides opportunities for students to apply what they are learning in the classroom in real-world settings.	-3*	3*	0*
8	Equipment used within the program is appropriate and state of the art.	-5*	-1	0
9 <sup>^</sup>	Faculty within this program cultivate within students a strong ethical commitment to the field.	1	0	0
10	This program effectively prepared students to perform mathematical analyses / calculations.	0	0	2*
11	This program focused on conceptual understanding of topics related to the field.	1	0*	2
12	This program and its faculty stressed the importance of professionalism inside and outside the workplace.	0	-1	1
13	Faculty within this program were well qualified to teach because they were knowledgeable about the subjects.	3*	0*	5*
14	Faculty within this program were good teachers and helped students learn.	1	1	5*
15 <sup>^</sup>	Having this program accredited by a national organization is important for students and their careers.	5	4	3
16	Faculty were interested in students' learning.	1	1	3*

*(continued)*

Table 1 (continued)

*Those statements that distinguish Factor 1 from the other factors*

No.	Statement	Factor 1 Grid Position	Factor 2 Grid Position	Factor 3 Grid Position
17 <sup>^</sup>	Topics addressed within this program are appropriate and current/up-to-date.	2	0	1
18	Students learn how to function in a diverse workplace through their course work at the University.	0	-3*	-1
19	Participation of students in student groups within the program is important for student success.	-2	-1*	-2
20	This program needs better facilities (classrooms, laboratories, etc.).	5*	-2*	-4*
21	This program would be more appealing to prospective students if it was not in Summit College.	4*	-1*	-5*
22 <sup>^</sup>	I would recommend this program to prospective students.	4	5	3
23	The university supports this program at an appropriate level.	-4	-3	-1
24	The program's course schedule works well for students.	-3*	-5*	0*
25	Students in this program are good at interpreting information presented in a variety of visual forms (drawings, graphs, etc.) in a variety of contexts.	-1	2*	-1
26	Students in this program are effective at presenting data / information.	-1	2*	-2
27	Students in this program have learned to work effectively in teams both in academia and in the workplace.	0*	2*	1*
28	Students in this program can work effectively as individuals in academia and in the workplace.	1	4*	0

*(continued)*



Table 1 (continued)

*Those statements that distinguish Factor 1 from the other factors*

<b>No.</b>	<b>Statement</b>	<b>Factor 1 Grid Position</b>	<b>Factor 2 Grid Position</b>	<b>Factor 3 Grid Position</b>
29	Faculty possess the type of technical expertise needed to teach courses in this program.	1	2	4*
30	Students in this program can perform the types of experiments/tests/data collection/data analysis required within this field.	-2*	0*	2*
31	Students who complete this program are capable of managing projects related to the field.	0*	4*	-3*
32	Having this program and its courses offered on the main campus of the University is important to students.	3*	-2*	0*
33	There is a lot of redundancy within this program (e.g. same or similar topics are repeated throughout the courses within the program).	-1	-1	-4*
34 <sup>^</sup>	Program faculty are up to date in their knowledge of their field and bring that knowledge to the classroom.	3	3	3
35	Program courses need to be updated so that they are more in line with current industry practice as you see it.	0*	-5*	-3*
36 <sup>^</sup>	This program offers sufficient opportunities for students to come into contact with other professionals in the field (who do not teach at this university).	-2	-1	-2
37 <sup>^</sup>	Student groups related to this program offer sufficient opportunities for learning more about this field.	-1	-2	-1

*(continued)*

Table 1 (continued)

*Those statements that distinguish Factor 1 from the other factors*

No.	Statement	Factor 1 Grid Position	Factor 2 Grid Position	Factor 3 Grid Position
38	There is not enough mathematical rigor within this program.	-5*	-4*	-1*
39	Students need to perform more written and oral presentations within this program to be prepared for their professions.	-4	-4	-2*
40 <sup>^</sup>	Program faculty are well qualified to teach within this program.	2	1	1
41	Students within this program learn how to write clear and effective engineering technology-related reports.	-2*	1	0
42 <sup>^</sup>	Students within this program learn how to effectively present information orally (speech).	-4	-2	-3
43 <sup>^</sup>	Students within this program can effectively use software to address technical problems and analyze data.	0	0	-1
44	Having this program recognized locally as a quality program is important for students & alumni.	2*	-2*	1*
45	I wish this program also had a graduate program associated with it.	4*	1*	-5*
46	This program makes students highly employable and prepared for the workforce.	-1*	5*	0*
47 <sup>^</sup>	The resources available at the university (sports programs, library, etc.) are important to this program and its students.	-3	-4	-3
48 <sup>^</sup>	It would be better if this program was in a college focused on just technology or engineering.	-2	-3	-4

*Note: \*Denotes distinguishing statement for that factor; ^designates consensus statement*

Table 1 summarizes all of the findings produced from the analyses. Separate tables include characteristic-sorts for each factor, distinguishing statements, and consensus

statements. Interpretation of each factor is based upon those statements that those represented by these factors felt the most strongly about (as indicated by grid positions provided for each factor as displayed – focusing on statements at the +4, +5, -4, and -5 positions as displayed in Table 1). Distinguishing statements, which differentiate one factor from the others, are also important for interpretation of each of the factors.

### **Factor 1/View 1: A good program that needs improvements in certain areas**

Overall, Factor 1/View 1 has a positive attitude about the Construction Engineering Technology program but believes that the program needs improved facilities, more support from the university, the addition of a graduate degree, and a position within a different college at the university.

Those represented by Factor 1/View 1 see the program's accreditation as important for students and their careers. Although they do not believe that students need to perform more written and oral presentations within their program, they do not believe that construction students learn how to effectively present information orally. Those represented by this view believe there is enough mathematical rigor within this program. This description is further supported by those statements that distinguish this factor from the other two, as indicated by asterisks in Table 1 within the Factor 1 grid-position column. However, these distinguishing statements reveal that those represented by View 1 also hold a neutral position about how well the program prepares students for their careers (statement 2) including project management (statement 31), and employability (46). This seems to coincide with statement 7 (at -3) that indicates this view does not believe the program provides enough application of construction in real-world applications. Thus, the Factor 1/View 1 was named "A good program that needs improvements in certain areas."

### **Factor 2/View 2: Practical Students - program that prepares students for the construction industry**

In Table 1, the column labeled "Factor 2 Grid Position" provides information about statement location and distinguishing statements for the Factor 2 view. Factor 2/View 2 represents six students in the Construction Engineering Technology Program. As Brown (1980) details, having six Q sorts on a factor is sufficient to provide a stable factor and ensuing description. Like Factor 1/View 1, those represented by this view possess a positive view of the Construction program (Statement 22 at +5) and of program accreditation (Statement 15 at +4). However, this view appears focused on the program's preparation of students to work in the construction industry. In other words, they appear more career-centered. Factor 2 students do not believe the construction courses do not prepare them to work in a diverse work place (Statement 18 at -3, a distinguishing statement). These students believe the construction program prepares them to manage projects (Statement 31 at +4, distinguishing) and work effectively as individuals (Statement 28 at +4, distinguishing) in academia and in the workplace. They believe the CET program makes students highly employable and prepared for the workforce. Typical university resources like sports and libraries are unimportant to those represented

by this view (statement 47 at -4). Those represented by the Factor 2 view expressed problems with the scheduling of courses (Statement 24 at +5) but satisfaction with the level of math in the program as well as oral and written presentations. Unlike the Factor 1/View 1 students, students representing this view believe the program provides opportunities for students to apply what they are learning in the classroom in real-world settings (Statement 7, +3 and distinguishing). Those represented by Factor 2/View 2 believe the construction program is in line with current industry practices (Statement 35 at -5). Factor 2/View 2 was named “Practical students - program prepares students for the construction industry.”

### **Factor 3/View 3: Program faculty make the program good**

The Factor 3/View 3 grid position column in Table 1 indicates the location of the statements for the representative sort for this factor/view. Like the other two views, Factor 3/View 3 sorters agree that the construction program provides a quality education (Statement 1 at +4). The remaining four of the ‘most like’ statements (+5 and +4 grid positions) start with the word “Faculty” or “Instructors” so it is easily seen that this view is most focused on the quality of instruction within the construction engineering technology program (Statements 4, 13, 14, and 29). Statement 16 is at +3 and distinguishing (Faculty were interested in students' learning). Those represented by the Factor 3 view disagree that the program needs better facilities (Statement 20 at -4, distinguishing) and that moving the program to a different college would make it more appealing to prospective students (Statement 21 at -5, distinguishing; Statement 48 at -4). Factor 3/View 3 representatives also disagree that they are interested in creating a graduate program associated with the construction engineering technology degree (Statement 45 at -5).

It is important to note that this was the factor that represents the lead- faculty person from the CET program (positive factor loading). It is also important to remind readers that this is also the factor which is bipolar in that there were both positive (10) and negative (2) loaders. Thus the negative loaders have a negative view of the program faculty, believe a graduate degree is desirable, and believe the facilities need to be upgraded, for instance. This factor was named “Program faculty make the program good.”

### **Consensus among the views**

Along with representative sorts and distinguishing statements, the Q analyses produce a table of consensus. These are the statements that do not discriminate among the pairs of factors. In other words, these are the statements that the three differing views agreed upon at various levels, based upon grid position which is also provided in the table. Table 1 contains the consensus statements for this study and they are indicated with a ‘^’ sign. Here we see general agreement that the program provides students the skills to continue to learn after graduation (statement 6) and the importance of maintaining the program’s accreditation (statement 15). All three factors have a grid position of +3 for statement 34 (Program faculty are up to date in their knowledge of their field and bring that knowledge to the classroom). However, the three views are neutral about statement

9 (Faculty within this program cultivate within students a strong ethical commitment to the field) and statement 37 (Student groups related to this program offer sufficient opportunities for learning more about this field). Students are also in agreement across all three perspectives that they do not learn how to effectively make oral presentations (statement 42). They agree that the program does not provide sufficient opportunities for them to network with professionals in the field (statement 36).

### **Limitations of the Study**

Typically, generalizability is a desirable goal of social science research. However, Q is not generalizable in the typical sense of that term. Thomas and Baas (1993) distinguish two types of generalizability in social science research by focusing on two types of generalizability: statistical inference and substantive inference. The more typical generalizability would be *statistical inference*, where the purpose is generalizing to a larger audience from a large, random sample of participants. Q methodology, however, uses *substantive inference*, where the focus is a more qualitative one about the *about* phenomenon (Thomas & Baas, 1993). In Q methodology, Q factors represent generalizations about how persons of a certain perspective think about the topic under investigation (Brown, 1980; Thomas & Baas, 1993). In other words, generalizations in Q relate to general principles such as the relations of and between factors (Brown, 1980).

All sorters were asked to comment on their “most like” and “most unlike” statement placements as well as their decisions related to the sort. I used these questions in prior studies and gained additional insight into the sorters’ views. However, in this study the students’ comments were minimal and sometimes missing. Not much insight, therefore, was gained by reviewing students’ written comments and that is why they are not included in the descriptions of the factors views. Because participation was anonymous, it was not possible to follow up with sorters with interviews or other means.

### **Discussion**

Classifying individuals into different perspectives (profiles) is helpful in various research situations especially in applications where different groups may be affected differently by programs (McNeil et al., 2005). In program assessment it is frequently important to address the various stakeholder groups differently to ascertain their needs; more successfully addressing stakeholder needs improves the effectiveness of the program and makes the recommendations more likely to be implemented (McNeil et al., 2005; Ramlo & Newman, 2010). Within this study, I have demonstrated how Q methodology can be used to describe these different perspectives in ways that can provide insight for program assessment much like that discussed by Ramlo and Newman (2010). The development of such profiles is necessary for effective program assessment and allows researchers to better inform stakeholders about group differences and to make improvements to address different groups’ needs. .

In this study, three unique views emerged from analyzing the Q sorts of 35 participants. The first view, Factor 1/View 1, agreed that the Construction Engineering Technology

(CET) program was a good one but they also wanted to see changes. Many of these changes were administrative such as the location of the programs within the university structure, funding, facilities, and the addition of a graduate degree. As far as instruction, this view believes that more real-world applications are necessary to better prepare students and their learning. Factor 1/View 1 consisted of 11 students – seven at the bachelor level and four at the associate level.

Factor 2/View 2 was more focused on the ability of the program to prepare students for the workforce and suggested that the CET program is doing a good job at this. Six students were represented by Factor 2. They disagreed with Factor 1/View 1 and indicated that faculty include sufficient real-world applications in their classrooms. They did agree with Factor 1/View 1 that the scheduling of classes is a problem. Those represented by Factor 2/View 2 had a more neutral view of faculty than the Factor 3/View 3 which was very faculty focused.

Factor 3/View 3 included the one female student-participant and the one faculty member participant. This factor represents 12 sorters total including five bachelor degree students and six associate degree students along with the faculty member. Of the five bachelor degree students, two have negative loadings on the factor. This means these two sorters have an opposing view relative to the positive sorters. In other words, whereas this factor is focused positively on the program faculty as key to the program's success, the two negative loaders would view program faculty negatively.

Overall, it is helpful to see how different stakeholders view the same program. Consensus in this study is also helpful because it helps us see the agreement among the sorters that CET students need to become better at oral presentations. Based on these findings, the researcher suggests that the next round of program assessment focus on examining the number and quality of presentations made within the CET program classes. Because written and oral communications are key program learning outcomes for the program based upon the accreditation agency, this appears to be an important but weak area within the program.

Other insight revealed that, although there is no consensus among all three factors, investigating the addition of a graduate program, improvements to labs, increased funding, etc. are also areas of potential future focus. These specific areas call for the college and university administration involvement because they require an investment of resources.

### **Conclusion**

The results from this study resulted in programmatic changes but also continued requests for improved support from the larger university. Those represented by Factor 1/View 1 believe that the Construction Engineering Technology program is good but needs improved facilities, more support from the university, the addition of a graduate degree, and a position within a different college at the university. Although course-fee money helped to update some of the program's laboratory facilities, larger university financial support is still wanting. New university leadership has encouraged the restarting of

conversations regarding a master degree program that would serve the various bachelor degree programs in engineering technology and applied sciences. The program remains in the same college but that college in the midst of change including a new college name and new mission that is more in line with programs such as Construction Engineering Technology.

Factor 2/View 2 students believe that the program can be improved with a greater focus on the preparation of students to work in the construction industry. The Construction Engineering Technology program has since increased service-learning opportunities as well as other work-experiences to address this view's belief on how to improve the program. Additionally, a department-wide Software Applications course has been replaced in the curriculum with one that is specifically designed for construction students with associated applications throughout.

Students and the faculty-member represented by Factor 3/View 3 believed that the construction faculty were key to student learning. Their belief that students did not experience sufficient project management preparation is addressed by the inclusion of more construction experiences that include service-learning, as previously mentioned. Overall, this study also provided evidence that the program is focused on continuous improvements for a recent accreditation visit as well as program self-study. Upon completion of this study, the results were shared as part of the university-wide program assessment process and satisfied that initiative's focus on assessment and evidence of continuous improvement.

In addition, results of this study indicate that leaders of student groups in CET may want to investigate how they can improve students' learning and application of construction knowledge to real-world tasks or for networking within the local, regional, or national job market. Currently some of these student groups participate in competitions that involve program specific applications such as estimating and it may be possible to expand this type of involvement, perhaps expanding into other competitions. Construction faculty need to be cognizant of students' desire for real-world tasks within the classroom as well as career networking. Finally, while the university decreases the overall number of tenure-track faculty positions across all programs, the results of this study reveal students' belief that maintaining the quality of program faculty, tenure-track and adjuncts, is necessary for upholding the quality of the CET program instruction.

### **Future Research**

In the future, additional stakeholders including alumni, employers of graduates, and the program industrial advisory committee, should also participate in the program assessment. Broader participation will also bring with it a need for a revised Q-sample that better matches the purpose of such a study. The ability to perform Q sorting offsite including the possibility of online Q sorting will need to be investigated. In addition, considering the brief comments written by student participants in this study, future program assessment should include interviews of the all sorters in order to further clarify their perspectives.

**Author Notes**

*Susan E. Ramlo* is a Professor of General Technology-Physics and Professor of Physics at The University of Akron.

Correspondence concerning this article should be addressed to Susan E. Ramlo at [sramlo@uakron.edu](mailto:sramlo@uakron.edu)



### References

- Brown, S. R. (1980). *Political subjectivity: Applications of Q methodology in political science*. New Haven, CT: Yale University Press.
- Brown, S. R. (2008). Q methodology. In L. M. Given (Ed.), *The Sage encyclopedia of qualitative research methods* (pp. 700-704). Thousand Oaks, CA: Sage Publications
- Brown, S. R. (2010). Q methodology. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 1149-1155). Thousand Oaks, CA: Sage.
- Dunlap, L. A. (2008). An effective approach to generating questions for guiding program assessment and reform. *Academic Leader, 24*(10), 1-6.
- Gardiner, L. R., Corbitt, G., & Adams, S. J. (2010). Program assessment: Getting to a practical how-to model. *Journal of Education for Business, 85*(3), 139-144.
- Jorgensen, M. (2008). Have you been flossing? An analogy for educational program assessment. *Assessment Update, 20*(5), 9-10.
- Martell, K. D., & Calderon, T. G. (2005). *Assessment of student learning in business schools: Best practices each step of the way*. Tallahassee, FL: Association for Institutional Research; AACSB International.
- McKeown, B. (2001). Loss of meaning in Likert scaling: A note on the Q methodological alternative. *Operant Subjectivity, 24*, 201-206.
- McKeown, B., & Thomas, D. (1988). *Q methodology*. Newbury Park, CA: Sage Publications.
- McNeil, K. A., Newman, I., & Steinhauser, J. (2005). *How to be involved in program evaluation: What every administrator needs to know*. Lanham, Maryland: Scarecrow Education.
- Newman, I., & Ramlo, S. (2010). Using Q methodology and Q factor analysis to facilitate mixed methods research. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (2nd ed., pp. 505-530). Thousand Oaks, CA: Sage Publications.
- Ramlo, S., & Newman, I. (2010). Classifying individuals using Q methodology and Q factor analysis: Applications of two mixed methodologies for program evaluation. *Journal of Research in Education, 20*(2), pp 20-31. Retrieved from [http://www.eeraonline.org/journal/files/v20/JRE\\_v20n2\\_Article\\_3\\_Ramlo\\_and\\_Newman.pdf](http://www.eeraonline.org/journal/files/v20/JRE_v20n2_Article_3_Ramlo_and_Newman.pdf)

- Ramlo, S., & Newman, I. (2011). Q methodology and its position in the mixed methods continuum. *Operant Subjectivity: The International Journal for Q Methodology*, 34 (3), pp. 173-192. doi:10.15133/j.os.2010.009
- Stainton-Rogers, R. (1995). Q methodology. In J. A. Smith, R. Harré, & L. van Langenhove (Eds.), *Rethinking methods in psychology* (pp. 178-192). London; Thousand Oaks, CA.: Sage Publications.
- Stenner, P., & Stainton-Rogers, R. (2004). Q methodology and qualiquantology: The example of discriminating between emotions. In Z. Todd, B. Nerlich, S. McKeown & D. D. Clarke (Eds.), *Mixing methods in psychology*. Hove; New York: Psychology Press.
- Stephenson, W. (1935). Technique of factor analysis. *Nature*, 136, 297.
- Stephenson, W. (1953). *The study of behavior: Q-technique and its methodology*. Chicago: University of Chicago Press.
- Thomas, D.D., & Baas, L.R. (1993). The issue of generalization in Q methodology: "Reliable Schematics" revisited. *Operant Subjectivity*, 16, 18-36.