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ORIGINAL PAPER

Q Methodology and Q-Perspectives® Online: Innovative Research Methodology and Instructional Technology

Brandy Brown Walker[1] · Yuhan Lin[2] · Richard M. McCline[1]

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Abstract
Q methodology is an underutilized research methodology in the fields of education, instructional design and instructional technology, yet is well suited to research on perceptions of learning, efficacy of design, technology adoption and other issues within those fields. One reason for its lack of widespread use is the somewhat cumbersome nature of the research process, including the lack of readily available mainstream tools to conduct data collection and analysis. The authors introduce Q methodology, discuss its relevance in educational and instructional technology research and introduce their design of a new tool, Q-Perspectives® Online (Walker et al. 2017). The authors provide examples of the how Q-Perspectives® Online makes Q methodology more accessible as an instructional tool, and provide examples of use in face-to-face, flipped and online classrooms. The authors also describe how the methodology and real-time analysis tool provide an opportunity to bridge the research/practitioner divide by creating an explicit merger of the learning and research environments.

Keywords Instructional technology · Mixed methods · Q methodology · Subjectivity

This paper provides a brief overview of Q methodology, shows its applicability for use in education and instructional technology research, and presents Q-Perspectives® Online as an innovative tool designed specifically for education and training settings. Additionally, three cases in which Q-Perspectives® Online has been used that include traditional face-to-face, flipped, and online classrooms are featured.

Q methodology is over 80 years old and has been used in fields as wide-ranging as educational psychology, political science, rural sociology, communication, public policy, public heath, science education and more. However, it is continually introduced across a wide variety of academic articles as a "new" research methodology, because it is either uncommon or new for that field or journal. The underutilization of Q methodology is partly due to misunderstandings related to its application, and to the inaccessibility of mainstream tools to conduct the data collection and analysis. Some researchers who learn about Q methodology find the principles underlying it too different from what they already know to adopt, or find the process and technology related to implementing the methodology too much trouble to pursue. Others become converts after recognizing the potential of Q methodology to help hear participant voices in new ways that will help further advance knowledge in fields interested in subjective understanding. Those who become converts often seek to bring others into the fold. And when you combine a convert from the field of instructional design and technology with an entrepreneur and a computer programmer, the result, for the authors of this paper, is a new tool that makes the methodology more accessible for new audiences in education, training and research settings.

✉ Brandy Brown Walker
bbwalker@uga.edu

Yuhan Lin
jimmylin@gse.upenn.edu

Richard M. McCline
rmccline@uga.edu

[1] University of Georgia, 1240 S. Lumpkin Street, Athens, GA 30602, USA

[2] University of Pennsylvania, 3700 Walnut Street, Philadelphia, PA 19104, USA

Q Methodology Overview

William Stephenson (1935, 1953) first conceived of Q methodology as means of objectively measuring subjectivity

within the field of educational psychology. Stephenson was a student of Charles Spearman, a pioneer in factor analysis (Good 2010). But Stephenson's creation of Q methodology was in direct response to what he felt was missing in the traditional factor analysis of "R" methodology, or the process of finding correlations between variables across a sample of subjects. Instead, Stephenson offered Q as a way to find correlations of subjects across a sample of variables. In this way, the factor analysis is by persons, not by items, and the results reveal groupings of people with similar perspectives, rather than generalizations about people's responses to items. The purpose of such a twist was to displace the focus from objective variables as defined by researchers onto subjective understanding as defined and operationalized by participants.

Q methodology consists of a data collection technique, a by-person factor analysis method, and a philosophical framework. The philosophical framework underpinning Q methodology is important to start with, as it is where many people go astray. As a scientific study of subjectivity, the philosophical underpinning of Q methodology contains a complex combination of quantifiable statistics and qualitative explorations. Although it is considered a mixed methods approach, the way in which qualitative and quantitative elements combine and cross their own epistemological barriers can be disorienting (Stenner 2011; Tashakkori and Teddlie 2009). See Ramlo's (2016) description of the history of Q methodology in relation to these research traditions for a detailed discussion of these challenges.

The purpose of a Q methodology study is to identify and categorize the perspectives, personal constructs and values of a specific set of participants on a subjective issue, topic or problem. Whereas the goal of a traditional R methodology study is to generate generalizable knowledge, the goal of a Q methodology study is to hear more specific nuances from participants and identify unique perspectives within a specific group, not a generalizable population. However, this qualitative goal is reached with the support of quantitative statistical analyses. To further complicate the matter, meaning is generated from each participant's engagement with the stimulus items, rather than any a priori meaning determined by researchers. These perspectives may confirm what is known or identify new points of view not previously considered.

Q Methodology Process

The first step in Q methodology is to identify a study's concourse, or the universe of communication around a given subjective topic (Brown 1993; Watts and Stenner 2012). The concourse represents the conversational possibilities around a topic, or the population of things that could be said about a given topic or issue. The concourse should cover a range of subjective items that participants could agree or disagree with, and not include items that are empirically true or false (Stephenson 1986). Representative items from the concourse are chosen to create a smaller set of items known as the Q set, or the stimulus items with which participants interact. Participants in a Q methodology study are called the P set and are not chosen as a representative sample but are purposefully chosen because their viewpoints matter in relation to the given topic.

Data collection occurs through a sorting activity called the Q sort which has traditionally been conducted in face-to-face settings using paper cards and a physical grid. The Q set is printed on same-sized cards with one stimulus item on each card. Participants are given a condition of instruction to use in sorting the Q set onto a forced distribution grid along a continuum from most disagree to most agree. The act of sorting the stimulus items based on each participant's own point of view serves to operationalize each person's subjectivity on the topic, thereby capturing their operant subjectivity (Brown 1980). Participants are asked first to sort the Q set into three broad categories of "agree," "neutral" and "disagree," and then to sort each item onto the forced distribution grid. After all items are sorted onto the grid, each person's sort is entered into specialized software for the analysis.

Analysis begins by correlating each person's whole sort, representing that person's subjective perspective, with all other participants' sorts. This by-person analysis is significant both methodologically and philosophically. Methodologically it switches up the traditional position of items as variables, and instead makes each *person* a variable. The philosophical twist is the emphasis on the holistic sorting of all items that each person undertakes. The result is each person's subjective viewpoint is operationalized by sorting the stimulus items. The by-person correlation matrix is factor analyzed to produce statistically significant groupings of sorts that suggest similar perspectives on the topic of study. Each factor is represented by an idealized sort called the factor array, which is a reconfigured Q-sort based on the composite and weighted z scores from all the participants who define a particular factor (Brown 1980; Watts and Stenner 2012). Following the Q sort, the researcher often asks participants to explain in writing or in interviews their choices in the most agree and most disagree positions, known as the characterizing statements, to help clarify the meaning of each factor grouping. The researcher uses the quantitative and qualitative data to interpret each factor to explain the emerging perspectives.

Q Methodology Studies

Within the field of education, subjectivity has been of particular interest to study students' experience of content, technology and learning environments, and to study subjective choices of faculty in curriculum design and technology adoption. Qualitative methods such as interviews and focus groups

or quantitative approaches such as attitudinal questionnaires have been the traditional means of studying subjective issues in education and instructional design. Q methodology offers an approach with a different emphasis on how the subjectivity of participants is made manifest. The forced distribution sorting activity provides a structure that makes participants think holistically about the stimulus items which do not require adherence to a priori meanings as determined by researchers (Brown 1993). Rather, meaning is operationalized by participants as they sort items in relation to one another. The statistical analysis of each person's whole sort emphasizes the relationship of perspectives rather than the significance of items, which has been identified as an advantage over the Likert scale (McKeown 2001). By combining the quantitative rigor of statistical analysis with qualitative constructivist meaning-making by participants, Q methodology offers a different way for educational researchers from a wide variety of fields to explore issues related to subjectivity.

For example, Q methodology has been used within the past decade to study student views of learning and attitudes toward science subjects (Hock et al. 2015; Ramlo 2016; Young and Shepardson 2018). It has been used to study student perspectives on the efficacy of pedagogical approaches (Paige and Morin 2015; Pruslow and Owl 2012). In addition, studies using Q methodology have been used to replace end of course evaluations and have focused on student behavior to inform the design of learning environments (Berkhout et al. 2017; Newman and Ramlo 2010). In addition to student perceptions, Q methodology has been used to study faculty perceptions to inform instructional design and engagement (Kopcha et al. 2016; Morrison and Wagner 2017; Roberts and Montgomery 2017). It has also been used in studies related to the adoption of technology and other educational interventions (dit Dariel et al. 2010; McPherson et al. 2016). In these instances, researchers chose Q methodology over other methodologies to capitalize on the affordances the methodology offered, including the unique combination of statistical power in a qualitative framework to scientifically study participants' subjective views.

However, the extent to which Q is used for pedagogical purposes within the classroom is limited. Pruslow and Owl 2012on using Q methodology as a meaningful collaboration and reflection tool within the classroom, but cautioned that "some instructors may find the process too time consuming or consider the technological requirements somewhat daunting" (p. 388). Their recommendations were to either use the sorting activity alone without any statistical analysis; to analyze students' sorts using a specialized free software called PQMethod which they referenced as the 2002 version from Peter Schmlock; or to use a general purpose statistical program like SPSS. The problem with the first option of using the sort without the analysis is that the power of the methodology is lost. The second option, PQMethod was in it can still be time consuming and daunting for teachers as each sort has to be manually entered into the program, and the output generates a great deal of data for someone using it as a teaching tool and not a research tool. Additionally, PQMethod requires a certain installation and setup process, and until 2014 required a DOS emulator as its interface (Schmolck and Atkinson 2014). The final option offered by Purslow and Owl (2012) to use SPSS is not only time consuming but also not recommended as it is not designed for the specific analyses called for in Q methodology and is not able to produce the factor arrays unique to Q studies (Brown 1993; Watts and Stenner 2012).

Q Methodology and Instructional Technology

Q-Perspectives® Online was developed in response to the need for more classroom-friendly instructional technology tools to bring the innovative Q methodology into educational and training settings (Walker et al. 2017). There are other new data analysis tools that have been developed recently to provide researchers with more accessible open-source resources (Zabala 2014; Bansick 2016). However, their goal is to support researchers, and not to address ways to help instructors easily incorporate Q methodology in the classroom. Recognizing that the time and effort on the part of the instructor is a barrier for adoption of Q methodology into reflection activities, Rieber (2016) designed a tool to integrate the Q sort portion into the classroom. However, while Rieber's solution, a computer-based sorting program, helps participants see patterns in their sorts in real-time during classroom activities, it stops short of using the factor analysis to create groupings in keeping with Q methodology.

Q-Perspectives® Online is an original web-based software application that offers something new for classroom and training environments. It was created in response to the need for an instructional technology tool to allow Q methodology to be more easily incorporated into educational settings. It addresses the challenges of time and the need for instructors unfamiliar with Q methodology to have an easy-to-use product. Additionally, it provides unique research opportunities for instructors and students to collaborate within the classroom. We will first describe the basic functions of Q-Perspectives® Online and then describe three cases in which it was used in face-to-face instruction, in a flipped classroom, and in an online class setting.

Participant Data Collection with Q-Perspectives® Online

Q-Perspectives® Online combines data collection with real-time analysis in one tool that offers unique benefits for students and instructors. There are two ways in which Q-Perspectives® Online collects data from participants. The first

is a simple input of the order of stimulus items that have been sorted in a face-to-face setting (Fig. 1). Students who have sorted their items onto a physical grid can record the placement of their items using the online input feature designed to match the physical sorting configuration (Fig. 2). The online input feature can be used on a computer or mobile device. This eliminates one time consuming barrier for instructors who no longer have to input each student's Q sort one at a time.

The second way for students to input their sorting data is to complete the entire sort online. This feature of Q-Perspectives® Online mirrors the protocol of the physical sort. The first screen (shown in Fig. 3) requires participants to sort the Q set into three broad categories of "agree," "neutral" and "disagree." This stage is promoted in Q methodology to help participants get an initial feel for the items and make preliminary decisions about their perspective. The next screen (shown in Fig. 4) reveals the empty full grid with the statements organized below into the three categories based on the initial sort. In order to maintain fidelity with the physical sorting experience, it is important that many if not all stimulus items can be seen at once so participants can make decisions based on the relationship between items and not focus on each item in isolation. Clicking on the "agree," "neutral" and "disagree" tabs allows each category to be seen at one time. Additionally, a zoom feature aids in seeing each item more clearly. Participants then sort each item onto the full grid to complete the data collection.

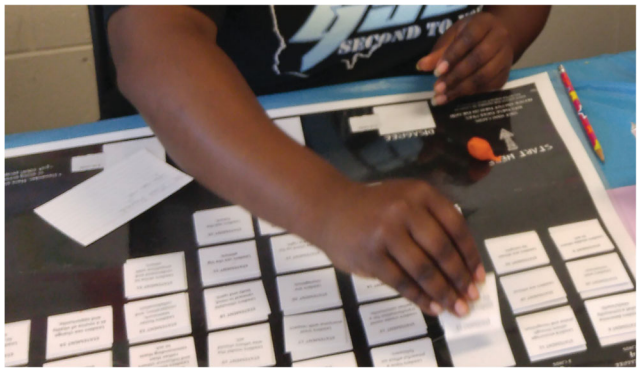

Fig. 2 Example of a face-to-face Q sort using Q-Perspectives®: Leadership Edition mats and cards

After students submit their Q sort using either the input only or fully online sort, they see a screen (shown in Fig. 5) that lists the statements they chose for their characterizing statements, which are the statements placed at the far ends of the grid in the most agree and most disagree spots. This screen requires students to input explanations for why they made each choice for their characterizing statements. Once they type and submit their answers, Q-Perspectives® Online automatically generates a pdf worksheet, referred to as the individual worksheet (shown in Fig. 6) that captures the characterizing statements and their explanations. Instructions on the pdf ask students to save and print their customized individual worksheet for use in the class activities to follow. This supports flipped

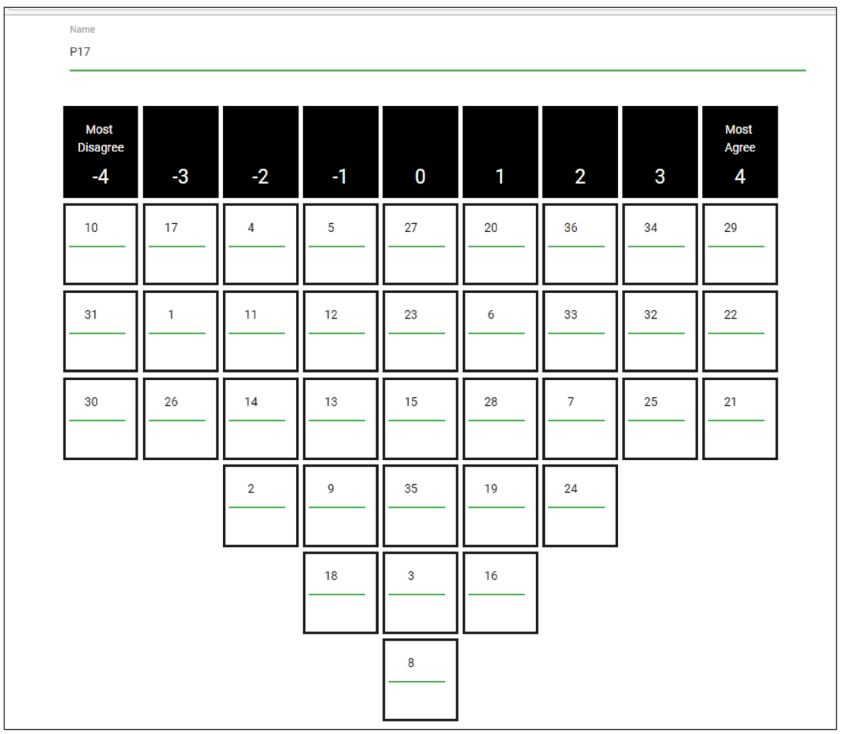

Fig. 1 Q-Perspectives® Online screen for users to input the number of each stimulus item after completing a physical face-to-face Q sort, resulting in real-time analysis

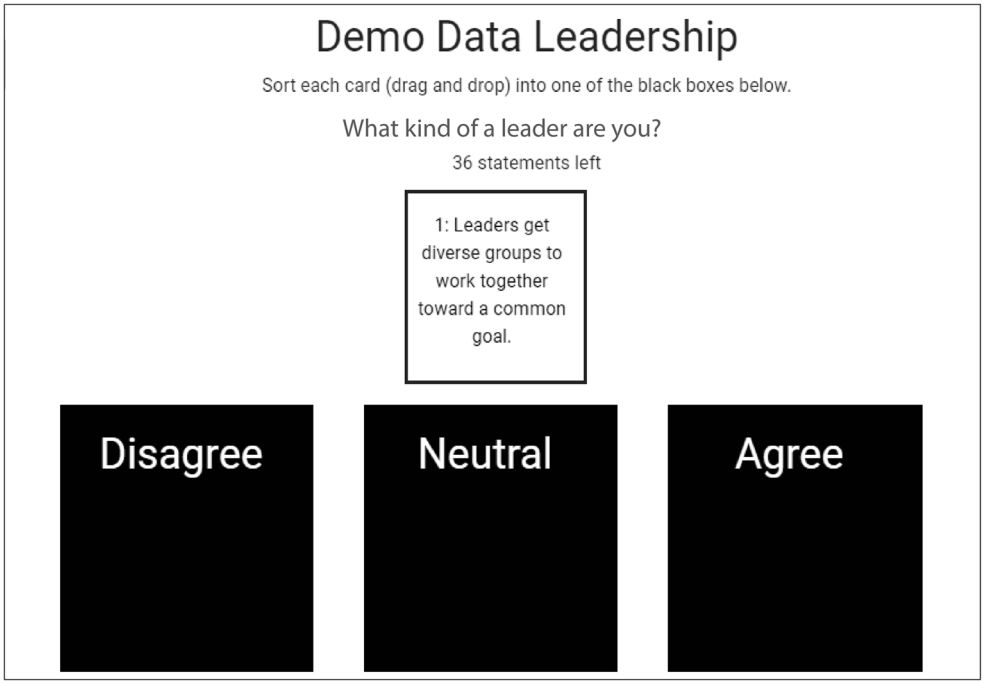

Fig. 3 Q-Perspectives® Online input screen for the first stage of a fully-online Q sort whereby users drag and drop stimulus items into the three categories indicated by the black boxes labeled "Disagree," "Neutral" and "Agree"

classroom models. Students come to class having completed the Q sort and with results that allow for more immediate engagement and discussion in the face-to-face class.

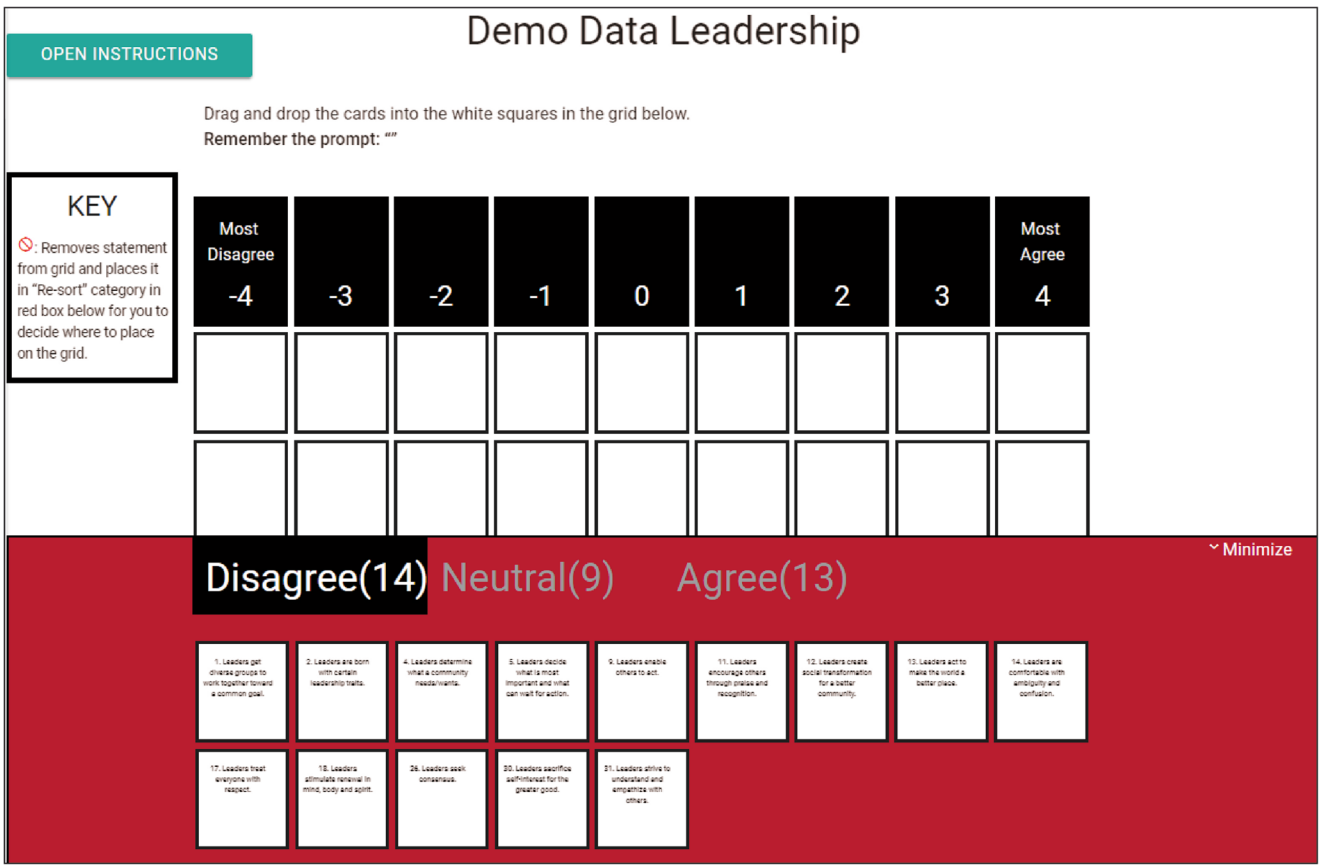

Fig. 4 Q-Perspectives® Online input screen for the second stage of a fully-online Q sort showing the previously sorted stimulus items in the categories of disagree, neutral and agree for users to sort on the full grid along the continuum from most disagree to most agree

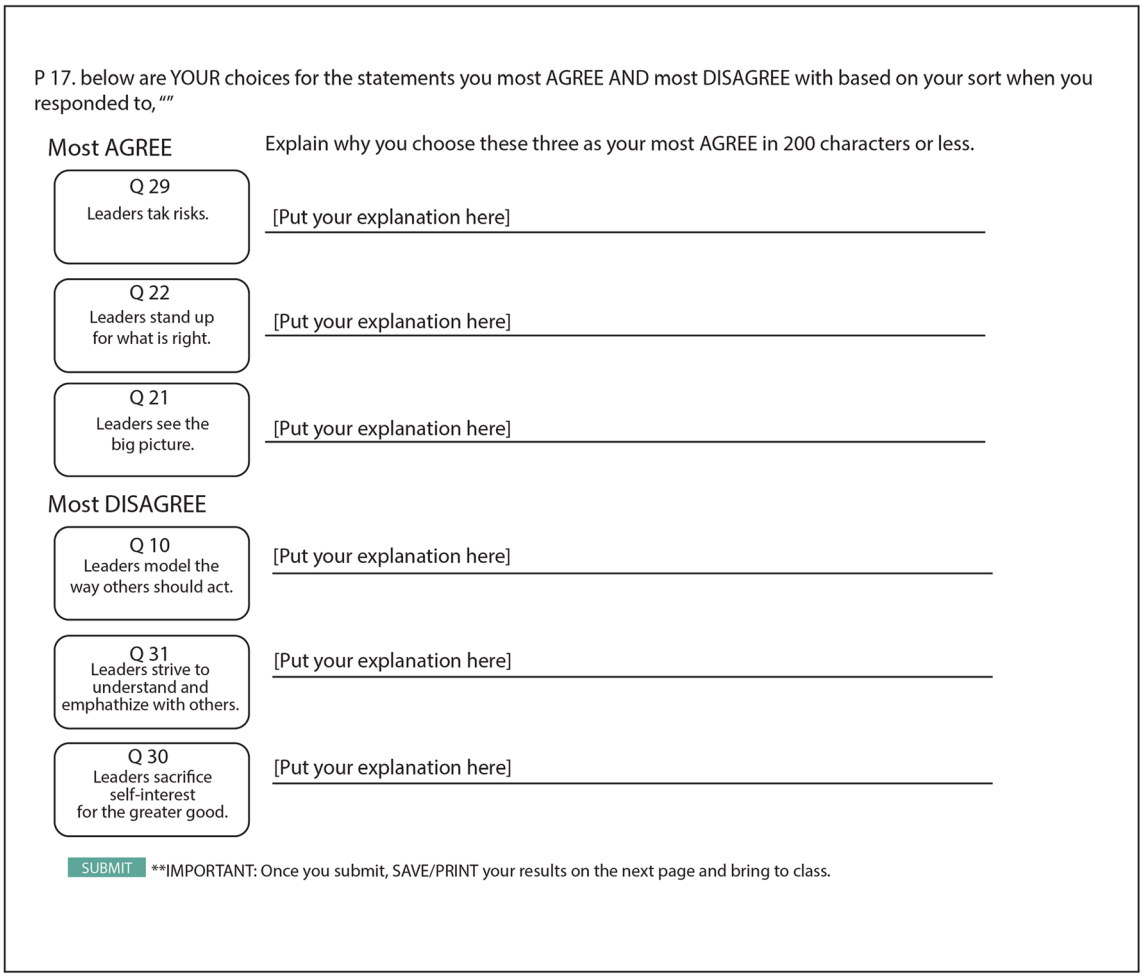

Fig. 5 Q-Perspectives® Online screen generated after a user completes the online Q sort; it displays the characterizing statements from the sort and requires users to explain why they chose each statement that they placed at the extreme ends of the grid

Instructor Materials with Q-Perspectives® Online

After each Q sort session is complete, either from a synchronous classroom of students completing a physical sort and using the online input to enter their sort data, or from an asynchronous class of students using the fully online Q sort function, instructors have immediate access to three outputs for use in the classroom. One output is a summary of raw data and the other two provide summaries of the analyzed data. The raw data summary (shown in Fig. 7) is a visualization of all participants' characterizing statements; the top three most agree items from each participant's sort are indicated by green stars next to the item number, and the bottom three most disagree items from each participant's sort are indicated by red stars next to the item number. The result is a snapshot of unanalyzed data that captures every participant's extreme feelings about the topic.

The analyzed data outputs in Q-Perspectives® Online are designed specifically for use in educational settings. Q methodology protocol is followed up to a point, and then specific threshold decisions unique to this tool are used to create outputs conducive to collaborative work in classroom and training settings (Walker and Lin 2017). Although the outputs from Q-Perspectives® Online can lead to research and specifically encourage collaborative research between instructor and participants, they are by no means intended to replace a full analysis including iterative researcher decisions as outlined in Q methodology. For that reason, Q-Perspectives® Online provides a one-click download function to export all of the necessary data from the Q sorts in formats to fit current research-oriented analysis tools.

The first analyzed data output generated in Q-Perspectives® Online is a listing of the factors, or groups that emerged in the factor analysis (Fig. 8). The groups are comprised of participants whose perspectives, as indicated in their whole sorts, were most closely aligned. Each factor or group represents a statistically significant perspective. One example of a unique threshold for this tool is the rule that every person must be in a group, and no group can have fewer than two people in it. When conducting the analysis of data as a researcher using a full analysis tool, it is

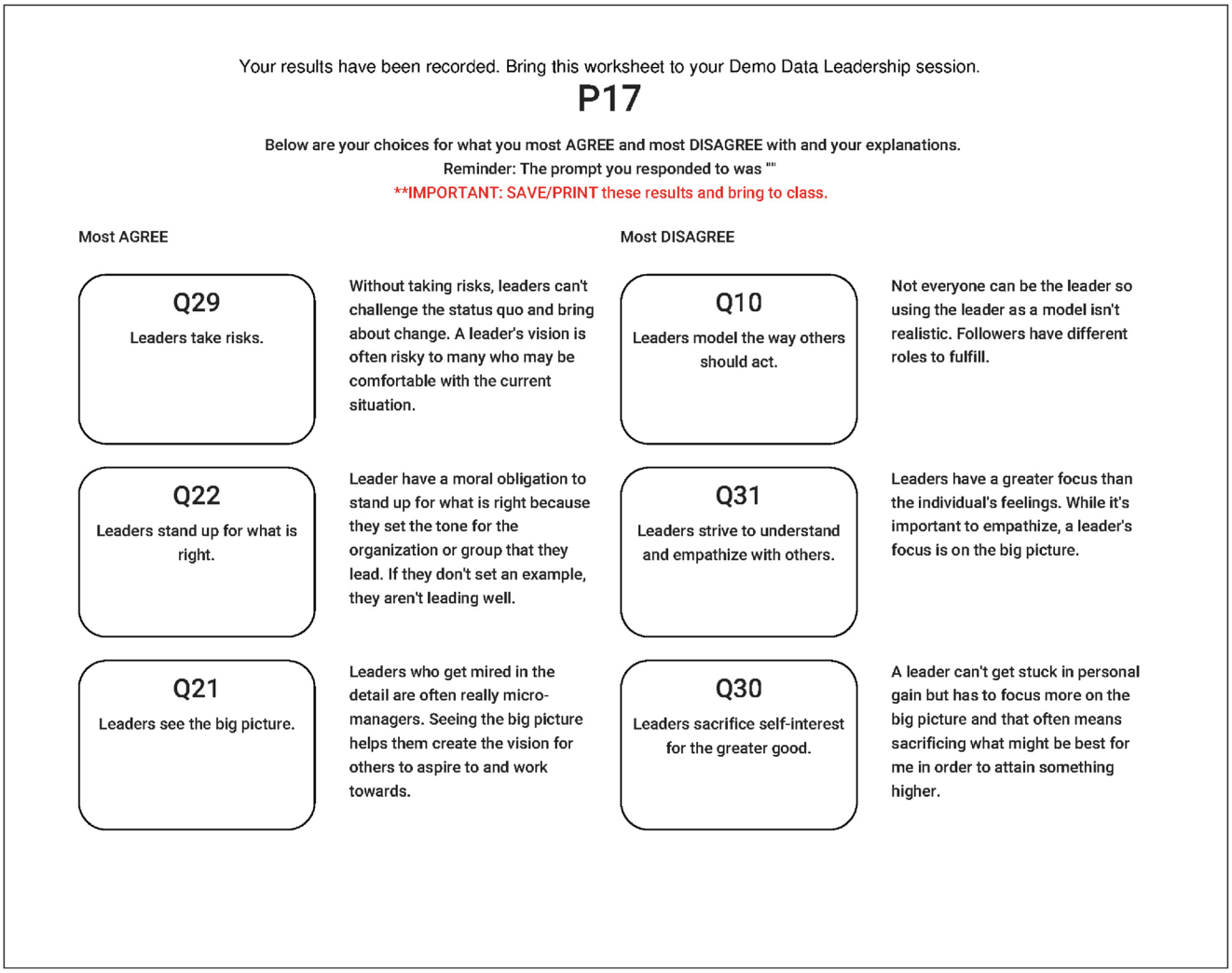

Fig. 6 Q-Perspectives® Online individual worksheet generated after users input their explanations for their characterizing statements placed at the extreme ends of the grid

quite possible that not all participants will load highly onto a factor, resulting in the potential for participants to be excluded from the final interpretation. This would not work in a classroom setting as an instructor would not want to tell students that they were not statistically significant. Therefore, the threshold decisions sort students into the factors that they most closely align with, even if a student's loading falls below statistical significance. The purpose of making this concession is to let every student's voice be heard in the group discussions. The fact that all students get to contribute to the meaning of the perspectives represented by their groups gives them an opportunity to voice any concerns they may have that their perspective is different from their assigned group.

One other unique occurrence that is possible in the groups that emerge in Q-Perspectives® Online is that a maximum of one name per group (usually only in one group) may be underlined as shown in participant 17 (P17) of Group 4 in Fig. 8. The significance of the underlined name has been a challenge to explain to participants, as it represents what is known as a bi-polar loading on a factor. Because absolute values are used in loadings, negative loadings can appear within a factor and represent polar opposite viewpoints within that factor. Just as students may not react well to being told they are not (statistically) significant, they also may not respond well to being told that their perspective is bi-polar. The threshold decisions in Q-Perspectives® Online attempt to eliminate bi-polar results, but short of placing a person in a factor of one, there is not a way to eliminate the possibility entirely within the tool. Our solution is to underline the one name representing the polar opposite perspective, and explain to that student, "You have an important role to play in your group's discussion because your perspective is the mirror image of the others in your group. You provide the opposite perspective, and can help them articulate what their group perspective is by sharing your mirror-image response, and they can do the same for you."

The second analyzed data output generated in Q-Perspectives® Online is the worksheet for each group (Fig. 9). The group worksheets summarize key data used by researchers

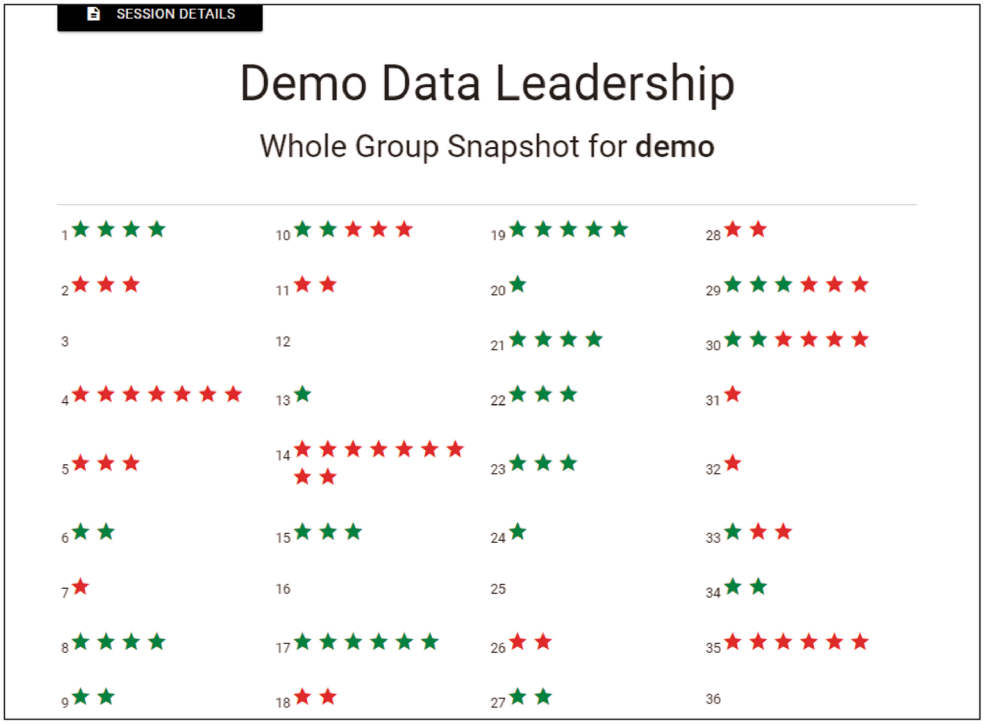

Fig. 7 Q-Perspectives® Online screen showing the raw data summary results for each participant's characterizing statements; red stars next to a number indicate each participant's choice to place that stimulus item in the most disagree spot on the grid, and green stars indicate each participant's choice for the most agree spot on the grid

to interpret the factor arrays that emerge for each perspective group. There is a great deal of data generated by a full analysis,

Fig. 8 Q-Perspectives® Online screen showing the analyzed data output of participants in factor groups

and the worksheets are designed to provide the minimum amount of data recommended to use when beginning to interpret factors (Watts and Stenner 2012). Each group worksheet lists the participants that belong in that group, followed by the top three most agree items for that factor array, the bottom three most disagree items for that factor array, the top three consensus statements for all groups (listed as "items all groups agreed on"), and a chart showing the top three distinguishing statements for each group (Fig. 9). Instructions at the bottom of each group's worksheet ask participants to use the information found on the worksheet to create a name and description for their perspective group.

Cases Using Q-Perspectives® Online

We will briefly describe how the various components of Q-Perspectives® Online can be used in a traditional face-to-face classroom setting case, a flipped classroom case and a fully online classroom case.

Face-To-Face Classroom

Q-Perspectives® Online was originally developed to accompany Q-Perspectives®: Leadership Edition, which is a product for leadership development consisting of a set of Q sort game boards and proprietary leadership statements cards identifying various attributes and behaviors of leaders (Walker and McCline 2015). This leadership development tool has been used in over 40 community leadership trainings as a learning, reflection and discussion tool to help participants articulate their own perspective of leadership, and to help faculty develop grounded theory

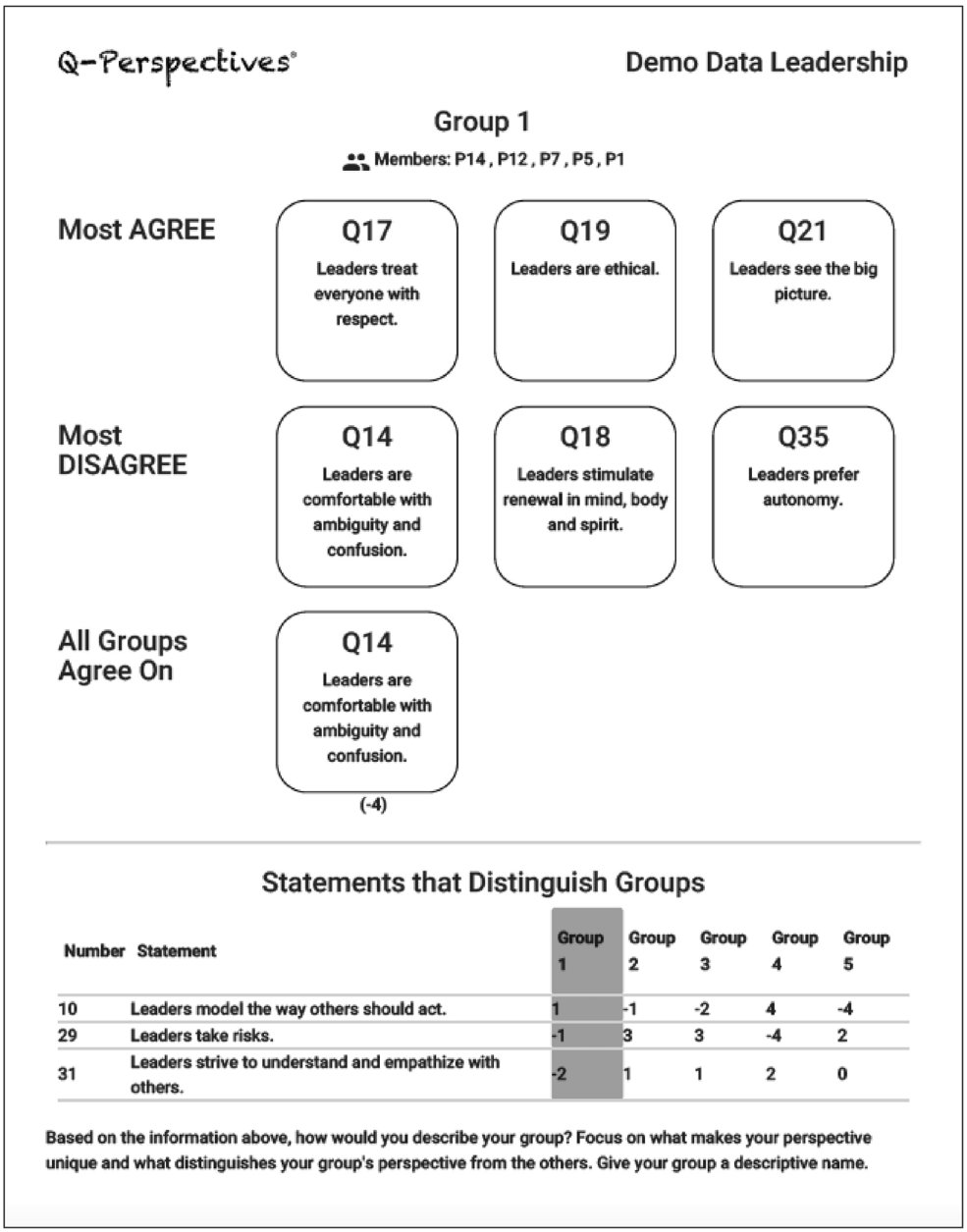

Fig. 9 Q-Perspectives® Online group worksheet showing details of the factors that emerged from the analysis; used by participants to identify their shared perspectives within groups and nuanced differences between groups

on the perspectives of community leadership held by participants in community leadership programs. A description of how a typical face-to-face leadership training session used Q-Perspectives® Online as an instructional tool follows.

Participants in the face-to-face leadership training conducted a Q sort using the Q-Perspectives®: Leadership Edition game boards and leadership statement cards (Fig. 2). Experiencing the tactile sorting process creates a different experience from sorting completely online, and we have found from practice that our community groups prefer this physical experience. After the sorts were completed, participants were given three red sticky dots and three green sticky dots. The statements were posted on flipchart paper on the wall and participants were asked to place their green dots next to the statements that they placed in their top three most agree and their red dots next to the statements that they placed in their bottom three most disagree. This mirrors the output generated in Q-Perspectives® Online, but we found that participants enjoyed the kinesthetic experience of getting out of their seats and physically placing the dots next to statements instead of just looking at the online results. Additionally, this step allowed participants to clearly see the agreement and disagreement across all statements writ large on the wall instead of small on the screen. Some classrooms might prefer referencing the online summary, which is less labor intensive as it does not require printing the stimulus items to post on the wall. Data from this step guided a large group discussion about the patterns the class saw in the raw data of each

person's choices for most disagree (red) and most agree (green) items. Observations that emerged related to what the range of extreme responses were (did every statement have at least one red or green dot?), which statements had the most red (most disagree) or green (most agree) responses, and which statements had the most combined red and green dots, indicating that there were opposite responses to those statements.

The next step for participants in the face-to-face sorting session was to input their final sorts to Q-Perspectives® Online using a mobile device or computer. This is a confirmatory stage for participants, as they "lock-in" their final answers by typing in the number of each item onto an online grid that corresponds to the grid onto which they have just sorted their physical cards. Having all students input their sort data at once during class makes a great deal of difference in the time commitment an instructor would otherwise have to generate analyzed results. The real-time analysis in Q-Perspectives® Online is immediately ready for classroom use. The instructor of these sessions displayed the group results on the screen listing how many factors or groups emerged from the statistical analysis, and instructed participants to get into the groups as indicated by the online system. Group worksheets were printed and distributed to groups. The groups were given the instruction to use the data on their worksheets to determine what made their group's perspective unique in comparison to the other groups in the room. After the small group discussions, each group reported out to the class what their perspective was.

In this example of face-to-face use of Q-Perspectives® Online, participants experienced individual reflection and learning as they operationalized their own subjective perspective through their personal Q sorts; they discussed the raw data focusing on the popularity of items based on each person's individual choices for the extreme ends of the continuum; and they participated in interpretation of analyzed data to name their own perspective groups. Participants benefited from the in-class activity and shared that they learned not only about their own leadership perspective but also about the perspectives of their classmates. Instructors in the class served as facilitators of this learning activity, and also left the session equipped not only with the quantitative data but also rich qualitative data from participants who provided their own in-depth analysis of their perspective using researcher data.

This example of the use of Q-Perspectives® Online skipped the individual worksheet step in which participants explained why they chose their characterizing statements, but it could be added in if time permitted. The individual worksheet was designed specifically for use in a flipped or fully online classroom setting to help participants capture their thinking immediately after their sorting experience, and bring that captured meaning to the face-to-face or online class discussion (Figs. 5 and 6).

Flipped Classroom

Our example using Q-Perspectives® Online in a flipped classroom setting involves undergraduate students. We used this method to deliver leadership lessons to large classes (between 45 and 75 students) in engineering capstone design courses for seniors. The purpose of each lesson was to have students reflect on what kind of leader they envisioned as ideal in their engineering field. Because we had to complete each lesson in a one-hour time block, we needed to use the flipped classroom model to maximize our in-class time to debrief the perspective activity. Students used the online sorting function of Q-Perspectives® Online to complete their entire sorting experience. After clicking submit for their final sort they were presented with a screen listing their characterizing statements and asking them to explain why they chose each of their top three most agree and bottom three most disagree items by typing their responses (Fig. 5). Once they typed their explanations and clicked submit, a pdf worksheet with their answers was generated including the instruction to save and print their results to bring to class for the face-to-face activity (Fig. 6). During the face-to-face activity, students were asked to pair up with the person next to them and use their individual worksheets to explain to each other why they made their choices. Because of the size of the classes and the lack of space in the classroom, students were not divided into perspective groups, but instead instructors used the factor group worksheets to interpret the perspective groups. Simply due to time, an overview of these groups was presented, and students were asked to identify the group with which they most identified. Students had a different experience of expressing their own voice in this scenario. However, with more time and appropriate space for grouping, the flipped option could use the individual worksheet for think-pair-sharing and the group worksheets for factor interpretation and perspective articulation.

Online Classroom

Our example of using Q-Perspectives® Online in a fully online classroom setting involves students in an online Curriculum Leadership doctoral program (Walker and Tamin 2017). In this instance, the professor dedicated a number of weeks for the students to engage in deep reflection, discussion, and analysis and interpretation of their own data. The professor, new to Q methodology, began this process somewhat skeptical that Q sort would "work" in this class because, based on a few weeks of readings and online discussions, her interpretation of the students was that they all shared similar perspectives. The results of the online Q sort did not confirm her suspicions, but instead revealed nine different statistically

significant perspectives in her class of 30 students. This result speaks to the ability of Q methodology as a pedagogical tool to capture nuanced differences not recognized through traditional classroom activities like discussions (synchronous and asynchronous). Students also generated their individual worksheets to explain their most disagree and most agree choices, and used those to engage in small group discussions. These first small groups were not related to the factor groups that emerged from the analysis but were heterogeneous. In these small groups participants discussed not only their choices but reflected on the process as well. Those discussions were followed by additional discussions to address the patterns in the overall class responses represented in the red and green visualization. The following week layered additional discussions within the perspective groups to move students deeper into reflecting on, understanding and articulating their perspectives. Overall, students agreed that the sorting, analysis, and staged interpretation discussions helped them learn more about their perspectives on leadership within their field than just readings and discussions alone (Walker and Tamin 2017).

Conclusion

Q methodology has a rich history in the study of subjectivity across a wide variety of fields, including studies related to perspectives, values, beliefs and subjective understanding in the field of education and instructional technology. Q methodology also has great promise as an instructional tool to facilitate reflection, understanding and the articulation of self and group learning. However, the process that researchers undertake to utilize the methodology is not easy to access or implement by the average classroom instructor. The authors of this paper developed Q-Perspectives® Online to bring Q methodology into the classroom for students as an instructional tool, and to offer opportunities for collaboration between students and instructors in the research process. We hope that more researchers and educators in fields related to educational communications and technology explore the innovative possibilities in Q methodology studies and classroom experiences using Q-Perspectives® Online.

Compliance with Ethical Standards

Conflict of Interest Brandy Brown Walker declares she has no conflict of interest. Yuhan Lin declares he has no conflict of interest. Richard M. McCline declares he has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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