Q pedagogy is a teaching approach that values the subjective viewpoints of students and incorporates them into the design of instruction. Q pedagogy is an instructional adaption of Q methodology, a research methodology first developed in the 1930s by Dr. William Stephenson to study people’s subjectivity. Q methodology uses a special data collection technique called a Q sort to capture a snapshot of a person’s subjectivity toward a given topic. The Q sort data of class participants are then factor analyzed to reveal groupings or clusters (i.e., factors) of students who share similar viewpoints. Next, the instructor designs a follow-up classroom activity, such as small- and large-group discussions, to help students understand and appreciate the different points of view held by their classmates and to support the goals of the lesson. A fictional design story is presented in this article to introduce Q pedagogy and explain how to implement it.

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The purpose of this article is to describe an instructional technique called Q pedagogy. It is based on the Q methodology. Q methodology is first and foremost a research methodology used in studying the subjectivity of a person or a group of people on a given topic. Dr. William Stephenson originated the Q methodology (hereafter referred to simply as Q) in the 1930s as an application of factor analysis and subsequently formulated a complete research methodology with its own underlying theory and philosophy (Brown, 1980, 1993; Stephenson, 1953; Rieber, 2020a).

To understand what Q pedagogy is and how it works, I will use a fictional design story (Parrish, 2006) featuring Chris, an
undergraduate at the University of Georgia as he participates in an environmental science course he is taking as an elective. Parrish (2006) describes design stories as fictional accounts of “an imagined journey that continues past obstacles until arriving at a decisive, positive outcome” (p. 4). Design stories offer several advantages to the designer. Design stories can be an important means of communication. A design story can help the designer better understand the design problem from the point of view of the user. Within a design team, design stories can communicate a shared vision of the purpose and goal of the design. Design stories can also provide an effective means to communicate the design and rationale to others, such as prospective clients, users, or readers of a journal article such as this. Most important, stories encourage empathy. You yourself may now already “feel” the tension building inside of Chris as he dreads the possibility of having to explain and defend his beliefs as part of class discussions. Although Chris is a fictional character, he is a composite profile of many actual students with whom I have met and worked as I have developed Q pedagogy.

This article is meant as a companion to a previously published article in IJDL on adapting Q methodology for classroom use (Rieber, 2020b). The previous article focused primarily on the technology tool developed for the project with a short explanation of the supporting and nascent instructional strategy. The purpose of this article is to focus on the development of that instructional strategy in the time since, an instructional strategy I now call Q pedagogy.

Q pedagogy is defined as any instructional approach based on Q. The data-gathering tool used in Q is a special forced-sort survey technique called a Q sort and likewise the Q sort plays a central role in Q pedagogy. The Q sorts of students are factor analyzed to reveal clusters (i.e., factors) of students who share like-minded views on the topic. These Q sort results are then used to inform the design of follow-up classroom activities to help students share their viewpoints as well as learn the viewpoints of others. These follow-up activities are the fundamental pedagogical elements of this approach. The predominant follow-up classroom activity I have explored in the research I have conducted independently and in collaboration with others (Rieber, 2020a; Dinkelman & Rieber, 2022; Rieber et al., 2022) is classroom discussion. However, other follow-up activities can be used depending on the instructor’s predispositions and creativity. The Q pedagogy approach described here has been field-tested in a variety of college classrooms, both undergraduate and graduate, beginning in 2015, but it is an approach that potentially can work in any instructional or training environment, including K-12.

Q pedagogy is based on seven key student-centered and teacher-centered assumptions, examples of which include the following:

- Students develop subjective opinions on topics they learn in school, whether teachers realize it or not.
- The subjective opinions students form influence their learning of the course content.
- Most students would share their opinions if they felt safe in the learning environment.
- There are educational and social benefits to students when they are guided to understand their opinions on a topic, followed by listening to and understanding the opinions of others.

Examples of teacher-centered assumptions include the following:

- Teachers must value and be interested in knowing the students’ subjective opinions about the course content.
- Q pedagogy must be viewed as a routine classroom activity for instructors to adopt the approach.
- For Q pedagogy to be viewed as a routine classroom activity, a teacher must be willing to overcome several barriers to learning this new instructional technique.

This article is organized into the following five sections: (a) Introducing and orienting students to the Q sort activity; (b) Identifying a suitable classroom topic and developing the Q sort materials; (c) Implementing the Q sort activity and collecting the Q sort data; (d) Analyzing the Q sort data and then sharing and using the results with students in a follow-up class activity (e.g., class discussion); and (e) Evolution of Q pedagogy.

Throughout, I will also explain some of the foundational tenets of Q methodology.

INTRODUCING AND ORIENTING STUDENTS TO THE Q SORT ACTIVITY

The first four weeks or so of the course were organized in ways like other courses Chris had taken. Yes, Dr. Simone had allotted significant time in class for people to share their views, but Chris was able to use his range of coping skills developed over many years to get through them. He was able to say just enough to satisfy Dr. Simone but without truly disclosing his deepest opinions in a way that might provoke someone to disagree with him. But now, Dr. Simone, announced that next week they would be trying out a different teaching technique based on something called a Q sort. Chris was intrigued. He had never heard about Q sorts before and wondered what they were all about. But Chris again felt a pang of anxiety when Dr. Simone explained that a Q sort activity would be a way for everyone in the class to identify their personal beliefs about environmental science. Then, she explained, “We’ll explore and discuss the different points of view held by the class.” Oh well, add/drop was long over, so Chris braced himself for what might follow.
Chris came to class the next week with much trepidation. However, he was careful to bring a laptop just as Dr. Simone had instructed in an email she had sent the night before. Dr. Simone gave an orientation about Q sorts by having everyone download a special Q sort app to install on their laptops.

Dr. Simone led a fun Q sort activity on the topic of natural wonders. Chris really enjoyed it. He had never heard of the Great Blue Hole before. Likewise, the photo Dr. Simone showed of Victoria Falls was very impressive. The goal of the Q sort activity was simply to sort the 25 natural wonders according to Chris’s preference for visiting each of them. He would have loved to visit them all, but he definitely had preferences. He had to sort the 25 wonders in a special grid. He wanted to pick three as his top choices, but the grid only had space to allow him to pick two. This frustrated Chris a little, but after some more thought, he was able to narrow them down to his top two. As soon as everyone completed their own Q sort and hit the “submit” button on the app, Dr. Simone was able to share some quick results about the class preferences. Interestingly, about as many people chose the Great Blue Hole as their top choice as their bottom choice. This triggered questions and reactions from people in the class. Chris eagerly joined in to come to the defense of the Great Blue Hole. He talked about wanting to learn how to scuba dive and wondered if people did scuba dive in the great blue hole. Several people agreed with him, but then another person explained she thought the Great Blue Hole sounded kind of scary.

Dr. Simone then asked if anyone was confused about what to do during the Q sort. Like Chris, some people wondered if they could “break the rules” and choose more as their top choices. Dr. Simone explained that forcing people to make tough decisions is a way to really discover what they valued the most. After asking a few more questions, Dr. Simone explained that their next Q sort activity would be on the topic of what it means to be an environmentalist.

It is unlikely that students have ever completed a Q sort before, so it is important to give them the opportunity to complete a practice Q sort to learn how it works. Any fun or interesting topic would do but choosing a topic that is at least tangentially related to the course’s subject matter is recommended. Making a poor choice here can give students a bad first impression of the activity. For example, early on I was using the topic of ice cream preferences for this first Q sort experience, but this topic was so trivial that it caused confusion about the purpose and benefit of the Q sort activity. The Q sort described in the design story provides a good example of what a fun practice Q sort looks like. Table 1 lists the 25 natural wonders and Figure 1 shows the Q sort grid into which the students must sort the 25 wonders according to their personal preferences for visiting. The guiding statement given to students is called the “condition of instruction.” In this case, the condition of instruction is “Please sort the following natural wonders from those you most to least prefer to visit.” The condition of instruction is very important in Q because it guides the participant as to what subjective stance to take. A totally different point of view can be triggered just by changing the condition of instruction, such as asking the participant to sort the statements by rating their environmental significance from high to low.

The symmetrical shape of the grid is important. The resemblance to an inverted normal curve is not accidental. By forcing participants to sort the statements into such a symmetrical pattern, the Q sorts are, in effect, becoming standardized. This is important because standard scores are needed to compute correlations between the Q sorts, which

![TABLE 1. A list of the 25 natural wonders used in a practice Q sort with the prompt “Please sort the following natural wonders from those you most to least prefer to visit.”](image)

![FIGURE 1. An example of a Q sort grid for a practice Q sort consisting of 15 statements. Typical Q sorts in Q pedagogy would consist of between 25-40 statements.](image)
are needed for the factor analysis which follows later (Watts & Stenner, 2012). The overall shape of the curve (i.e., its kurtosis) matters less if the shape is tall and short or long and fat. However, the shape can be used to force greater or lesser discrimination among the choices at either end of the grid. For example, if the participants are novices or generally not knowledgeable about the topic of the Q sort, a taller, narrower shape with more choices in the middle and fewer choices at the extremes will be easier for the participant to complete because it allows more choices for which the participant might be indifferent or not have strong feelings. However, if the participants are experts or very knowledgeable about the topic, a wider and fatter distribution would be better to help the participant discriminate between their strongest preferences (Watts & Stenner, 2012).

At first glance, a Q sort may seem to be just another survey type. One may rightly ask why not just use some other more common survey type, such as surveys using Likert-type responses? The answer can be found in the philosophical framework of Q methodology. Q’s underlying theory and philosophy are fundamentally different from the survey types used by quantitative researchers, which Q scholars label as R approaches. For example, in an R survey, the researcher defines the construct—and hence the meaning—associated with an individual survey item. Q researchers make no such claim and instead assign meaning solely on the outcome of the Q sort. In other words, it is the participant, not the researcher, who assigns meaning to the results. See Watts & Stenner, 2012 for more background on the philosophical differences between Q and R research methodologies.

The next step is to create the Q sort materials and give them to the students to complete. Q sorts are traditionally completed in paper form. In a Q research study, it is usually not necessary to construct more than one or two sets of materials. Data collection within a Q study typically takes place individually with each participant, so the materials can be reused throughout the study. However, creating enough paper-based materials for all students to complete the Q sort at the same time in class is not practical for Q pedagogy. This is even more true in an online course.

Relying on paper-based materials would never meet the assumption that Q pedagogy must be viewed as a routine classroom activity for teachers to adopt it. For this reason, a technology solution in the form of a digital version of the Q sort activity is needed. Several exist and some are free (e.g., Easy HTMLQ by Shawn Banasick, 2021), but others are quite expensive (e.g., Q-Assessor; https://q-assessor.com/pages/3010). However, all of these were designed for Q researchers, not teachers using Q pedagogy. Consequently, I have developed a free digital Q sort app with an accompanying instructor web portal designed specifically for Q pedagogy (see Rieber, 2020b, for a description of the design). This technology allows an instructor to build a Q sort activity within minutes once the Q sort statements and the condition of instruction have been identified. The Q sort is then “delivered” to all students simultaneously via an app that runs on both Macintosh and Windows computers. The Q pedagogy’s web portal also allows teachers to share their best Q sorts with others if they wish.

Interestingly, it is preferred for a student’s first Q sort experience to be paper-based if possible. Completing a Q sort on paper is very intuitive based on my observations and talking to students. Students also report it to be a satisfying tactile experience moving cardboard cards around the grid. Consequently, when I am teaching a face-to-face class and there are no more than about 20 students in the class, I always prefer to use paper-based materials so that students’ first Q sort experience is easy to understand. But, as already mentioned, the disadvantage of doing so is the excessive time it takes to construct the materials. More details about administering a Q sort will be discussed later.

IDENTIFYING A SUITABLE CLASSROOM TOPIC AND DEVELOPING THE Q SORT MATERIALS

Dr. Simone gave everyone some homework in preparation for the Q sort activity about what it means to be an environmentalist. First, everyone had to come up with their own definition of environmentalist in 20 words or less.

Dr. Simone stressed that she was not interested in getting textbook answers, but instead wanted each person to really think about the question and create a totally personal answer. That was easy for Chris because he was now actually thinking of changing majors to pursue environmental science as a career. That evening, after several drafts, he came up with this statement: “Someone who educates themselves on environmental issues, takes action to address environmental problems, and shares their knowledge with others.” He strongly felt that one must be educated about a topic to form an opinion. He also felt it was important for an environmentalist to lead a life that followed the principles he believed in. Finally, he thought it was important for an environmentalist to share their knowledge with others. This last point made Chris uncomfortable because of how shy he was, but he felt strongly about it nonetheless. With confidence, Chris emailed his statement to Dr. Simone.

Obviously, the statements used in the Q sort activity are very important. But where do these statements come from and what criteria should be used in identifying them? This step is critical because the success of the rest of the activity depends on the statements representing the topic fairly and evenly. Doing a poor job here would likely result in the activity failing. In Q methodology, the statements come from the concourse of the topic. Theoretically, a concourse is everything that can be expressed about a given topic.
Q researchers often spend months and even years developing a concourse. A good example is a study done by Gretchen Sneegas (2019) on attitudes toward fracking. She interviewed dozens of stakeholders (i.e., farmers, agriculture extension agents, local community leaders, etc.) in eastern Pennsylvania and western New York over a period of about two years to learn what they had to say about fracking. This was one of the most important steps she took to develop her concourse. A thorough concourse can easily consist of hundreds of statements about the topic. Of course, no one would be willing or able to complete a Q sort consisting of hundreds of statements. So, the next step is to organize the concourse in such a way as to draw a sample of statements that faithfully represent the concourse. This is called the Q sample (or the Q set). The number of statements in a Q study typically ranges from about 30 to 80 statements, depending on the complexity of the topic. More than about 80 statements make completing the sort impractical.

A concourse can also be developed from a bounded system, such as harvesting statements from one or more key articles about a topic. Another approach is the one used by Dr. Simone in the fictional environmental science course. She asked her students to submit their personal statements written in their own words about what it means to them to be an environmentalist. In this way, an instructor can gather a wide range of statements quickly. A knowledgeable instructor should then supplement the list to add other points of view that are missing. The instructor would still need to edit the list of statements to remove redundant statements or revise several statements that are basically expressing the same view into one statement, however retaining the students’ voice in the statements is important. The statements for the Q sort can also be revised and updated in subsequent semesters. In this way, the concourse and the resulting Q sort activity can be continually refined and improved.

The topic for a Q sort should be one that naturally garners different points of view. The topic should also be broad enough to allow for divergent opinions to emerge. In other words, the topic needs to be firmly a subjective one. Dr. Simone’s topic of what it means to be an environmentalist is a good example. Notice also that Dr. Simone’s homework for the group likewise was open-ended leading to divergent responses. A good way to solicit subjective statements is simply by asking students to respond using the following question format: “In 20 words or less, what does [INSERT TOPIC] mean to you?”

IMPLEMENTING THE Q SORT ACTIVITY AND COLLECTING THE Q SORT DATA

The day after Chris submitted his personal statement about what he thought it meant to be an environmentalist, he received an email from Dr. Simone with the second part of the homework assignment. All students were to complete a Q sort based on the statements that everyone had written. Chris was eager to do so. He immediately launched the Q sort app and punched in the code. There were 32 statements to sort, all with different definitions of what it meant to be an environmentalist. As he read them, he found himself immediately being drawn more to some than others. It felt good to see the statement he wrote on the list. Of course, there were some others that made him grimace, such as “Someone who is an earthy, crunchy, hippie type person who distorts the truth to make a point about the environment.” But he already knew from previous class discussions that there were several people in the class who voiced their disdain about the big ideas of the course.

Chris completed the Q sort and submitted his responses using the app. Not surprisingly, he ranked his own statement as a +4 and the “earthly, crunchy, hippie” statement as a -4. But all the statements really made him think and it was hard at times to decide where to sort various statements. When he was done, it struck Chris that he now had a pretty good idea of the range of ideas of the people in his class just from reading each of the statements carefully and trying to figure out how to sort them. He could not help but think more about some of the statements in the days that followed.

Completing a Q sort (whether paper-based or in digital form) always begins with a pre-sorting activity. Students are instructed to first sort the statements quickly into three piles: those they generally prefer or agree with, those they do not, and then the rest. The idea is to look at each statement and quickly move it into one of the three piles. Then, starting with the pile they feel most positive about, they begin sorting the statements into the grid. Next, they turn their attention to the pile they felt less positive about, followed by sorting the remaining statements. The digital Q sorting tool includes the pre-sorting step.

Students typically find the sorting activity both challenging and interesting. Many report that the sorting activity has a game-like quality about it. The challenge, as Chris observed, is that the sorting grid only allows for a certain number of statements in each column. This forces the student to make difficult choices. The completed Q sort can be considered a snapshot of the student’s subjective point of view about the topic. Interestingly, in a person’s entire Q sort acts as a single data point. That is, the rating of any individual statement only has meaning in the context of the rating of the other statements. This is another important attribute that distinguishes Q sorts from R surveys. When the student is satisfied with their sorting of all the statements, they click the “Submit” button to have their responses uploaded to a database on the web server. The digital tool also saves a copy of their responses within the app should they wish to view their responses later.
ANALYZING THE Q SORT DATA AND THEN SHARING AND USING THE RESULTS WITH STUDENTS IN A FOLLOW-UP CLASS ACTIVITY

As Chris waited in the hall for the next class with Dr. Simone, he again felt that pang of anxiety. Would he be forced to disclose which statement was his? Would he have to defend his ideas? He easily imagined everyone in the class staring at him while he struggled to say a single word.

Class began with Dr. Simone sharing the results. She put a slide on the screen that showed that there were three different clusters of groups of people and that each group had a distinctive point of view about what it means to be an environmentalist. Chris was in the second group along with eight others. All the groups were told to go and have a small group conversation. Dr. Simone also gave each group a new white t-shirt with a bunch of different colored markers. Each group had to figure out and articulate what was their collective group opinion about what it meant to be an environmentalist. Dr. Simone said that each group should think of themselves as a team. What was your team going to be called? She told each group to think of a team name or a slogan that describes their group. She said to write that team name or slogan on the t-shirt using the markers. She also said to feel free to draw a picture or some other graphic that visually depicts your team’s viewpoint. “After all,” she said with a smile, “all teams need a good team t-shirt.”

Chris was immediately put at ease. He knew he was going to be talking to others who shared a view like his. This made it easy for him to talk and express himself to this small group. In fact, the other members of his team were really impressed with the facts Chris readily pulled from memory that came from the course's diverse readings to support the group’s ideas. Chris's group came up with a great slogan and a great visual design for their t-shirt. He, and the other group members, were eager to share their ideas with the entire class.

Even though other groups—one in particular—had very different views from Chris's group, Chris had no problem speaking on behalf of his group and even challenging the other group for evidence to support their position. It felt great to both speak and listen because everyone kept the discussion constructive and professional. It was one of the best classroom discussions Chris had ever participated in. It was only later did it occur to Chris that this was one of the few times that he dared to share his views in such a public forum. He thought about how good it felt at first to know he was part of a group that had similar views. This gave him the confidence to speak and support others in his group who also spoke up.

The outcome of a full Q analysis is the identification of distinctive perspectives held by the participants. This is done using factor analysis. An adequate explanation of factor analysis is beyond the scope of this article (see Kline, 1994 for an introduction), but its principal use is as a data reduction technique. It is often used in exploratory analyses by R researchers, such as determining if the items in a survey instrument are measuring different or similar constructs or attributes. Survey items can be deleted or merged with other items measuring similar things, thus reducing the overall number of items. It is also used in confirmatory analyses to test the hypotheses of a given theory.

In Q, exploratory factor analysis is used to identify clusters of people in a group who hold similar views about a topic. It is typical for the viewpoints of a class of 20-30 people to be reduced to a small number of like-minded affinity groups. There are software packages available that do the specialized factor analysis needed in Q, the most prominent is Ken-Q, also by Shawn Banasick (2019). Data collected from my digital tool can be exported into Ken-Q with a full factor analysis completed within just a few minutes (by a trained individual).

Although factor analysis will reveal these clusters (i.e., factors) of people holding similar viewpoints, it will tell you nothing about how to interpret the viewpoints. In Q research, a variety of qualitative processes, such as abductive reasoning, are used in the interpretation of the factors. The process of interpretation is very difficult and takes weeks or months to complete. However, and fortunately, in Q pedagogy we can skip the need for a researcher to do the interpretation and instead transfer the task of interpretation back to the students. This is where the real power of Q pedagogy becomes most evident.

As illustrated in the design story of Chris, once the groups have been identified the next step is to task each group of students with defining themselves. The Ken-Q software provides several good resources that can be used as a helpful handout for each group. For example, Ken-Q provides a composite Q sort, both in a table and visual form, which is essentially a weighted average Q sort based on all the Q sorts of the people in the group. We have found that distributing the composite Q sort as a handout, coupled with the discussion of the group itself, helps to guide the group to create a catchy slogan, motto, or team name. Groups are also encouraged to draw a logo or image that represents their team. Groups are usually quite eager to come back to the large group to share their team slogan and graphic.

Rightly or wrongly, the fact that statistics were used in an unfamiliar procedure called factor analysis to identify each of the groups lends an aura of objectivity and authenticity to the small group activity. Students accept the results of the factor analysis with few or no questions. Students enjoy the fact that they are part of an affinity group that shares similar...
views, though it’s important to remind them that their views are only similar, not identical.

I should also point out that factor analysis does not guarantee that all students will be solidly placed within one group. It is common for a person’s Q sort to be on the boundary between two groups, without rising to the level of statistical significance to be included in one of the groups. I have used this as an opportunity to ask these individuals to consider themselves as “referees” who might be able to clarify nuances or temper disagreements between groups when the whole class discussion takes place.

The factor analysis will almost always show them leaning more toward one group versus the other, so I place them in that group but without including their Q sort in the calculation of the composite Q sort. Although it is important not to quell their voice in the small group discussion, I make it clear that they are “on the bubble” between this group and another, so their role should be more as a listener and arbiter than a contributor to the team identity.

Also, on rare occasions, one factor is determined to be bipolar. This means that an individual is identified as part of the group but in a negatively correlated way. In other words, their point of view is considered the opposite of all other members of the group. Again, I deal with this simply by explaining the phenomenon to them. I also advise them to listen more than speak during the small group discussion and to decide if the group’s self-definition is, in fact, opposite of their own beliefs. Back in the whole group discussion, it is good to give them the opportunity to speak the counterpoint to the group’s position.

Q Analysis Lite

There are always barriers to learning a new teaching approach. Each barrier has the potential to cause the design to fail. A significant barrier for most instructors who hear about Q pedagogy is the thought that they must learn factor analysis to begin implementing it. Without minimizing the learning curve it takes to learn factor analysis at a depth that would satisfy a statistician, in practice the learning curve to sufficiently learn and apply factor analysis with the help of the Ken-Q software package is not steep. That said, the need to learn factor analysis at any level remains a significant barrier for many teachers.

Fortunately, the digital software tool I developed for Q pedagogy performs a variety of preliminary analyses automatically. These have proven to be very useful in stimulating rich, whole-class discussions. The statistics provided in these analyses are ones that most teachers are usually familiar with, namely frequency, sums, standard deviations, and

FIGURE 2. A screen shot summarizing general results for the Q sort.
correlations. I call these Q analyses lite because they are stepping stones to understanding what factor analysis would provide. Another advantage of these preliminary statistics is that they are available immediately after students complete the Q sort without the need for any additional work by the instructor. These were the fictional “quick results” provided by Dr. Simone for the class discussion after the Q sort on 25 wonders of the world.

Figure 2 shows a screenshot summarizing general results for the Q sort. Although Figure 2 looks complicated at first, this screen contains many descriptive statistics that are very approachable to explore. First, notice that the statements appear twice in two separate columns. The statements on the left are listed in order of their overall sum of ratings. Recalling that the rating scale shown in Figure 2 goes from +4 to -4, a statement placed in one of the grid’s “most agree” slots by all the participants would have a large positive number. Conversely, a statement that is placed in one of the “least agree” slots by all participants would have a large negative number. Interestingly, statements rated neutrally by all participants or statements that polarized participants (e.g., half rating it highly and the half rating it lowly) would each have a sum near zero. To account for what it might be, the “Max” and “Min” columns show the sum of people who rated a particular statement with either the maximum or minimum rating. These statements tend to be the ones that distinguish one viewpoint from another and are usually the best discussion starters.

The statements shown in the column on the right are displayed according to the degree to which everyone’s rating of the statement agreed with one another by using standard deviation as a proxy for agreement. When you click on a particular statement in either column, its matching statement is highlighted in the other column. This allows everyone to explore how people rated each statement relative to the other statements.

Finally, the “Are You Like Me?” option gives each person access to the correlations among the participants, as shown in Figure 3. A participant clicks on their username in the left-hand column to see how their Q sort response correlated with the other participants (shown in the right-hand column). Significant correlations (positive or negative), if any, are shown with an asterisk. These correlational data offer a precursor to like-minded groups in the class, something that the factor analysis would show because the correlation matrix is the raw input for the factor analysis.

Teachers could organize follow-up activities to take advantage of these correlations, such as by also assigning small
group discussions of two or three people. Obviously, this approach is like what has been previously described using the factor analysis results. However, the correlational data is “messier” or “fuzzier” than the factor analysis results. It is difficult to identify larger groups where everyone’s Q sort is significantly correlated with all others in a larger group.

THE EVOLUTION OF Q PEDAGOGY

The hypothetical example of Chris purposely represents a best-case example of helping reticent students express their views on a controversial topic in a safe and constructive learning environment. Chris’s story is meant to communicate the potential and value of Q pedagogy. However, like any design innovation, Q pedagogy is based on a series of field tests and iterations over many years. For example, my first attempt in 2014 at applying Q methodology in my teaching was a failure. In this section, I present an overview of the evolution of Q pedagogy from that initial failure to its current development. The story of how the pedagogy evolved intertwines intimately with the design of the Q sort app, as first explained in Rieber (2020b). As mentioned at the beginning, the present article is meant as a companion to Rieber (2020b). The following is a short review of the story presented in Rieber (2020b).

I first became acquainted with Q in 2013. In 2014 I had just completed a research study using Q with colleagues at the University of Georgia and thought the methodology offered promise as a classroom tool. In the fall of 2014, I tried out a paper-based Q sort in one of my graduate classes. Doing so required me to produce enough printed materials to have each student in the class complete the Q sort at the same time (approximately 30). These materials required manually cutting out each of the 33 statements for each set, a very time-consuming procedure. I knew I could not do any statistical analysis during class, but I had hoped that the act of completing the Q sort would trigger some interesting discussion. It did not. The lack of a structured debriefing after completing the Q sort resulted in few comments and no meaningful discussion. Follow-up reactions from the students were mixed with several students questioning the value of the activity.

Despite this initial failure, I continued to believe that Q held promise as a classroom strategy if I could overcome logistical hurdles in its implementation. In the spring of 2015, I began work on developing a digital tool to deliver the Q sort and collect the data. An initial, but crude, prototype was ready for field testing in the summer of 2015. The course I was teaching was a design course, so sharing and field testing this early prototype was consistent with modeling the design process. Consequently, the students tolerated the roughness of the design. A key feature of this first prototype was the ability to collect the Q sort data and export it as a comma-separated values (CSV) file suitable for opening in a spreadsheet. I was able to do a crude analysis using descriptive statistics (e.g., frequencies, means, standard deviations) while the students were on a break. Although not a Q analysis, this crude analysis was sufficient to support a meaningful class discussion.

Given the promising results of the summer of 2015, I continued work on the Q sort prototype and field tested each successive prototype in the graduate courses I was teaching in the fall of 2015, spring of 2016, and summer of 2016. These were all online courses. Students usually completed two Q sorts in each course on a subjective topic in the course. For example, one course was an introduction to instructional design for teachers. Toward the end of the course, they completed a Q sort on what “instructional design for teachers” means to them. They contributed their own personal statements, written in their own words, from which the statements for the Q sort were developed. By this time, the digital tool included the option to export the data to the Ken-Q analysis software. Affinity groups resulted from a full Q analysis and these results were used to conduct an online group discussion. All these trials were well-received by students. Of course, I was the instructor for all these courses, so it was important to begin to explore the use of Q pedagogy with other instructors in different domains.

In the fall of 2016, a colleague in the College of Public Health agreed to collaborate with me to field test the prototype in her introductory environmental health science course. This collaboration lasted two years during which a total of three field tests were conducted in separate classes (Rieber et al., 2022). Each of these classes had approximately 70 students enrolled. The physical environment was a lecture hall with fixed seating. Consequently, only large whole-class discussions were feasible after completing the Q sorts. Despite this limitation, the discussions were lively and constructive using just the Q analysis lite results available immediately through the app. We also conducted follow-up discussions based on a full Q analysis during a subsequent class. Although these discussions were productive, the inability to break the large group into smaller, affinity groups, was limiting.

In the fall of 2018, I began a collaboration with another colleague, a professor in social studies education. The field tests we conducted in his courses have been the most successful of all trials conducted so far. This collaboration continues as of this writing. The success has been based on an interesting alignment of this professor’s mastery of a dialogical approach to teaching, the content of the course, and the affordances of Q pedagogy. Because of this professor’s dialogical approach, students come to class each week knowing that they need to be engaged and active in class discussions based on weekly readings. The topics he has chosen for the Q sorts have likewise been well aligned with Q methodology in that they are somewhat controversial and require each person to...
Another example would be pairing up people who do not share similar views to interview each other and provide a report of their interview. A key point is that Q pedagogy does not dictate what the follow-up activity should be. Instead, instructors are encouraged to come up with their own creative approaches based on the needs or goals of the class.

In my teaching, I have used Q pedagogy in the teaching of design thinking, instructional design, and research methodologies, courses I have taught for many years. Students learn the facts, concepts, principles, processes, and procedures of these core topics, but I often found myself wondering if they believe these processes work or have value in their own lives. Until beginning to use Q pedagogy I have been dissatisfied with my attempts to find out. My collaborations with faculty in environmental science (Rieber et al., 2022) (from which the fictional account of Chris was inspired) and faculty in social studies education (Dinkelman & Rieber, 2022) have been critical in my effort to explore and develop Q pedagogy. These content areas have proven to be fertile areas for exploring student subjectivity. One might also ask if instructors who teach “objective” subjects or topics would find Q pedagogy useful. Frankly, I am hard-pressed to list any such objective subjects. It seems no matter how objective a certain subject or topic might appear on the surface; students will be formulating a range of opinions about them. Consequently, it would be beneficial for both the instructor and the students to know what they are.

Any new approach to teaching faces barriers to adoption. My collaborations with other instructors point to four significant barriers that teachers need to overcome to adopt Q pedagogy:

- **Barrier 1:** Resistance to adopting any new teaching strategy.
- **Barrier 2:** The perceived need to learn factor analysis.
- **Barrier 3:** How to create a Q sort.
- **Barrier 4:** Understanding the steps to implementing the Q sort in a classroom.

This article has tried to point out key moments in the implementation of Q pedagogy where these barriers exist and could cause the design to fail. Technology mitigates barriers 2-4, such as the Q sort application developed for this project (Rieber, 2020b) and the availability of the Ken-Q analysis tool. Of course, technology also tends to create its own set of barriers, such as learning how to use the technology fluently enough for routine use.

Finally, it is important to emphasize that when Q pedagogy is successful it is because primarily of two things: First is William Stephenson’s innovative Q research methodology and second are creative teachers who design follow-up classroom activities that take advantage of the Q sort results. Q pedagogy relies on a synergistic partnership between the
unique research methodology of Q and its exclusive focus on studying subjectivity and innovative teachers who find creative ways to use the methodology in the classroom. Technology’s role, appropriately so, is a supportive one to make the delivery, administration, and scoring of Q sorts practical.

REFERENCES