Unpacking Q-Research: Context-Specific Considerations and Implications for Climate Change Education in Rural Areas

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Abstract
In this paper, we argue that William Stephenson, Q-methodology, when demonstrated through the research conducted for the SANCOOP: Climate & Beliefs project can provide guidance for doing context-specific mixed-method research and has implications for climate change education in South Africa. In the project, Q-methodology was mixed with techniques of transcendental philosophical analysis, to investigate the correlations between subjectivity and climate change adaptation in rural South African context. Subsequently, context-specific considerations are in order, since limited research employing mixed Q-methodology has previously been conducted in rural South Africa. Thereby, we hope to provide some guidance for conducting mixed methodological research in this context. Finally, the implications of mixed methodology for climate change education in South Africa are discussed in the light of epistemic justice in the construction of knowledge.

Keywords
Beliefs, climate change education, humanities, mixed methodology, philosophy, Q-methodology, research methods, rural research, social sciences

Introduction
Q-methodology (also referred to as Q) was developed by physicist/psychologist William Stephenson in 1935, who was interested in finding a way to reveal the subjectivity involved in any given situation (cf. Stephenson, 1935a, 1935b). Q as a research tool “encompasses a distinctive set of psychometric and operational principles that, conjoined with statistical applications of correlational and factor-analytic techniques, provides researchers with a systematic and rigorously quantitative procedure for examining the subjective components of human behaviour [sic]” (McKeown & Thomas, 2013, p. 9). Stated simply, Q permits the study of human subjectivity and the communicability of subjective viewpoints in the discourse on a particular topic through qualitative and quantitative techniques (Akhtar-Danesh, 2016; Brown, 1993; McKeown & Thomas, 2013). It could be argued that the study objective of Q-methodology encompasses more than merely human behavior and is more akin to a phenomenology.

Q-methodology uses techniques of factor analysis, but specifically correlates respondents, instead of scale items (Coogan & Herrington, 2011; Finchilescu & Cooper, 2018). The result of this can be interpreted as factors consisting of clusters of respondents with similar subjectivity on the issue at hand (Akhtar-Danesh, 2016; Finchilescu & Cooper, 2018). Q does not test the respondents, nor does it impose a priori meanings on the issue in question (Coogan & Herrington, 2011). Meaning is allocated a posteriori; in terms of processes of interpretation, that “allow us to understand and explicate the viewpoints or perspectives they represent holistically and to a level of qualitative detail that simply cannot be matched by other methods” (Watts, 2009, p. 43).

The above considerations made Q-methodology especially suited for use in research contexts where there are cultural and worldview differences between researchers and respondents, for example in the case of climate change research in rural and indigenous communities in South Africa. The SANCOOP: Climate & Beliefs project investigated the flexibility of climate beliefs in rural South African communities by means of Q-methodology and aimed to preserve authentic community discourses in relation to the science of climate change. During this project, the need for climate change education was identified by respondents in the particular communities. Since climate change education

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should ideally take the cultural and worldview considerations of the communities in question into consideration, the use of Q-methodology was expanded to this role. In section 7 of this article the use of Q-methodology in informing education practices will be further elucidated.

In the South African context limited research has been conducted using Q-methodology (cf. du Plessis, 2019; Finchilescu and Cooper, 2018; Hagan and Williams, 2016; Jooste et al., 2018; Schuman et al., 2018; Terblanché-Greeff et al., 2018; West et al., 2016). For this paper, a South African Q study (cf. Jooste et al., 2018; Schuman et al., 2018; Terblanché-Greeff et al., 2018) will be analyzed to elucidate the context-specific considerations for researchers using Q-methodology in South Africa. After providing the necessary background information about the study, a brief description of the Q process is presented, using the study per example at each step. The advantages of using Q-methodology are briefly mentioned, followed by the alterations and consideration when conducting Q studies in the South African context. Lastly, one of the most fruitful considerations, namely that Q-methodology might be used to facilitate education in a South African context, will be highlighted and discussed.

The SANCOOP: Climate & Beliefs Project

The SANCOOP: Climate & Beliefs project (hereafter referred to as the project) was conducted as part of the South Africa–Norway Research Co-operation on Climate Change, the Environment and Clean Energy (SANCOOP), from 2014 to 2017. Project funding was received from the Research Council of Norway (RCN) and the National Research Foundation (NRF). Prof. Karen O’Brien from the University of Oslo and Dr Ruth Ananka Loubser of North-West University were the Principal Investigators, directing an interdisciplinary team of researchers and students.

The research team collected a body of empirical data in several South African communities to understand belief system flexibility in relation to climate change adaptation. Three rural communities in the North-West Province of South Africa were chosen for the collection of data: Ikageng, Jouberton, and Ventersdorp. The communities were identified as the sampling pool based on their rural status, where low economic income and high levels of vulnerability are prevalent (Jooste et al., 2018; Terblanché-Greeff et al., 2018). Furthermore, the expectation was that rural communities might exhibit more traditional African beliefs compared to urban communities which might display higher levels of secularization (Terblanché-Greeff et al., 2018). Respondents were chosen using purposive sampling, based on their willingness to participate and failing initial recruiting, snowball sampling was used to procure additional participants (Schuman et al., 2018).

Since this study involved people’s personal experiences regarding climate change adaptation and beliefs, as well as a determination of their subjective viewpoints, it was deemed appropriate to use a mixed-method approach, such as Q-methodology. The method was successfully employed to determine community experiences and understandings of climate change adaptation while producing statistical data to test the hypothesis that there is a link between climate change adaptation and belief systems (Schuman et al., 2018; Terblanché-Greeff et al., 2018).

Some of the project outputs include presentation of the work at international conferences (cf. Loubser, 2014a; Loubser, 2015a; Loubser, 2016; Loubser, 2018; O’Brien, 2016a), several international guest lectures (cf. O’Brien, 2016b; Loubser, 2014b; Loubser, 2015b; Loubser, 2015c), and articles in peer-reviewed journals (cf. Jooste et al., 2018; Schuman et al., 2018; Terblanché-Greeff et al., 2018; O’Brien, 2016a). In addition to these formal outputs, the project also facilitated the exchange of research staff between the two participating universities, as well as the training of postgraduate students who completed their degrees during the project. At the conclusion of the project, a workshop on Q-methodology and its application as a qualiquantological method was held for university researchers on 24 August 2016, at Kumkani Lodge, Potchefstroom, South Africa. Additionally, a community feedback session was held to communicate the progress of the experiment to the members of the participating rural communities. This session also included some information/education about climate change (as requested by the communities during the project).

Although it will not be possible to summarize all of the findings of the project in this paper, the following aspects can be highlighted in relation to Q-methodology, as well as the implications for its use in education. Generally speaking, the project aimed to investigate whether beliefs have any impact on the way people perceive climate change, as well as on their willingness and ability to adapt to it. In this regard, the project was successful. It has been determined that within the specific context of the project, participants who regard themselves as religious exhibited evidence of influence from their religious beliefs, and that this may both improve their ability to adapt to climatic changes or impede it (Schuman et al., 2018). Furthermore, findings regarding the participants’ beliefs of time orientation seemed to have particular bearing, in so far as climate change is experienced in actual time and the respondents’ awareness of climatic change is mostly based on present- and past experiences. When these beliefs then inform behavior, however, the motivation for climate change adaptation is based on possible future events and scenarios (as opposed to present- and past perspectives). In some traditional African conceptions of time, future events cannot constitute time and are suitably referred to as no-time (cf. Mbiti, 1969). This future view (belief) of no-time may prove to be challenging for climate change adaptation as lit-
ticle emphasis is placed on future events (Terblanché-Greeff et al., 2018). These findings show that it is worth pursuing the incorporation of belief systems in climate change research and that Q-methodology might be considered a suitable method in this regard.

When considering the implications of the use of Q-methodology to facilitate education about climate change, the following findings are important. By investigating the links and interactions between external- and internal realities, examined from the perspective of contextual vulnerability in relation to climate change, the project focused on the multifaceted structure and functions of belief systems. From the research, it was gleaned that the communities in question simultaneously held various worldview narratives and that various factors may introduce challenges to climate change adaptation, by increasing resistance to belief revision (Jooste et al., 2018). This means that educational strategies that target climate change adaptation need to take these divergent viewpoints into account to foster the perception of internal control (rather than incite reactionary resistance) and thus encourage the desire to learn more (Jooste et al., 2018). In the next part of this article, the aforementioned methodological and educational implications will be discussed in more detail.

Q-Methodology

The primary research method utilized during the project was Q-methodology, as it provides the means to investigate subjectivity. A Q-method study is conducted based on the following steps: (1) defining the concourse; (2) developing the Q-sample; (3) selecting the P-set; (4) Q-sorting; and (5) analyzing and interpreting results. These steps are supported by interrelated elements such as “technique (Q-sorting), analytic methods (correlation, factor analysis, and computing factor scores), and methodology (a comprehensive logic of inquiry drawing on behaviorism, indeterminacy, quantum theory, and abductive logic)” (McKeown & Thomas, 2013, p. 88). Each of the steps will be briefly discussed to familiarize the reader. In addition, the project will be presented per example of each step to highlight the use of the method in rural South African context.

Step 1: Definition of the Concourse

The first step will entail the identification of the concourse under investigation. Here, the concourse is the flow of communicability regarding any topic—a discourse about everyday life that can include all modes of communication regarding a specific topic (Brown, 1993; du Plessis, 2005; Stickl et al., 2019). The concourse may be constituted by primary and secondary sources; as such, the concourse can include interviews, discussions, photographs, artworks, newspaper reports, music selections, etc. (Brown, 1993; du Plessis, 2005; McKeown et al., 1999; Watts & Stenner, 2005). Supportively, Brown (1993) states that the “idea of concourse incorporates virtually all manifestations of human life, as expressed in the lingua franca of shared culture” (p. 95). Therefore, the concourse provides the raw materials—concerned with life as it is lived—from the respondents’ vantage point (Brown, 1993; Coogan & Herrington, 2011).

To create the concourse, a total of 103 respondents were interviewed for the project. Interviews were conducted at predetermined locations in the rural communities at set times. During the interviews, two questions were posed: “What do you think about the climate?” and “Do you think it will be possible to change your beliefs about the climate?” The posing of two questions is unusual as one question would normally suffice to demarcate the concourse in Q (this choice in research methodology will be further explained in section “Two Concourse Questions”).

More often than not, the researchers had to explain what was meant by the word “climate” (i.e., the weather over an extended period) as interviewees were unfamiliar with the terminology. Therefore, to avoid hermeneutical injustice (as a form of epistemic injustice) the researchers briefly interpreted the conditions of instructions, which is uncommon in Q. To clarify, hermeneutical injustice is a “form of injustice that is experienced by individuals or groups (usually minorities) who do not possess the shared social resources or linguistic tools to make sense of their particular experiences. What makes this a form of injustice is not only that these individuals are excluded from the sphere of meaning-making, but also that they might be less motivated or predisposed to believe their own testimony just as others are less inclined to believe in their testimony” (Etievibo, 2016, p. 409).

Once the interviewees understood the terminology, it became apparent that they are familiar with what the concept entails even though they might use different wording to explain “climate” from their subjective point of view. Interviews lasted between 5 and 70 minutes, and responses were recorded and transcribed. The final concourse was presented in text-format, which enabled the next step in the process: the development of the Q-sample.

Step 2: Development of the Q-Sample

Out of the concourse, a set of statements—referred to as the Q-sample—must be identified; with these statements being qualitative in design (Newman & Ramlo, 2010; Van Exel & De Graaf, 2005). When organizing, analyzing, and presenting the concourse, the researcher superimposes categories on the data that are operant, that is the categories are based on functional distinctions (Brown, 1993). The Q-sample is made up of statements that identify various assertions about the social phenomena under investigation and aims at being “broadly representative of the opinion domain at issue” (Watts & Stenner, 2005, p. 75). More specifically, the 40 to
50 selected statements of the Q-sample should represent the concourse in “miniature,” which can prove to be challenging based on the size and complexity of the concourse (Brown, 1980, 1993; du Plessis, 2005).

Out of the 103 interviews with respondents, 40 statements were identified to make up the Q-sample of the project. Four main areas of inquiry were utilized as categories to identify a Q-sample that will be representative of the concourse: (1) causes of climate change; (2) time orientation; (3) solutions to climate change; and (4) meta-beliefs. The 40 identified statements represent the concourse as it builds on the posed research questions. Examples of the Q-sample statements that were identified for the project are: Climate change is caused by the fighting of the ancestors; We can solve environmental problems by returning to the ways of the past; It is possible for humans to control the climate through technology; and It is difficult to educate people about climate change because of their beliefs. Refer to Appendix 1 for the complete Q-sample.

**Step 3: Selection of the P-Set**

Following the definition of the Q-sample, a P-set (or person sample) has to be identified. The P-set can be defined as the sample of respondents who will rank order the Q-sample in the next step of the Q-study process (Stickl et al., 2019). The selection of respondents can be based on pragmatic and theoretical considerations (McKeown & Thomas, 2013; Watts & Stenner, 2005). In other words, respondents can be identified based on availability, or based on their relevance to the goals and subjective dimensions of the particular Q-study (Terblanché-Greeff et al., 2018).

Q-methodology does not aim to yield statistical significance to generalize findings to a larger population (du Plessis, 2019). Instead, the aim of a Q-study is to reveal the attitude, viewpoints, and beliefs held by a respondent or particular group of respondents; as such, large numbers of respondents are not a prerequisite (Stickl et al., 2019; Watts & Stenner, 2005). As representativeness is sought, the number of respondents typically ranges from 40 to 60 individuals to enable the identification of significant factors in Step 5: Analysis and interpretation.

For the project, purposive sampling based on the respondents’ availability led to the random identification of 51 respondents from the original interviewee sample. This identified P-set made up the pool of respondents who participated in the first Q-sorting. Additionally, a second P-set of 25 respondents were identified out of the original interviewee sample, and these respondents participated in the second Q-sorting. The identification of a second P-set is out of the norm as one P-set should suffice for the Q-sorting process in Step 4. Nonetheless, the circumstances of the project dictated that a second P-set be identified. A discussion as to why two separate Q-sorting sessions were conducted will be presented in §6.4.

**Step 4: Q-Sorting**

After the definition of the concourse, the development of the Q-sample, and the selection of the P-set, the Q-sorting can ensue. During this fourth step, respondents are asked to rank the Q-sample statements in order through the process known as Q-sorting (Watts & Stenner, 2012). This is the “technical means whereby data are obtained for factoring” in Step 5: Analysis and interpretation (Brown, 1980, p. 7).

Normally, Q-sample statements are presented on small randomly numbered cards, which the respondents have to rank based on their degree of (dis)agreement as per the condition of instruction (Brown, 1993; Coogan & Herrington, 2011; Dennis, 1986; Previte et al., 2007; Stickl et al., 2019). More specifically, the condition of instruction serves as a guide for the sorting of the Q-sample statements based on the respondent’s subjective point of view (McKeown & Thomas, 1988) and will depend on the type of Q-study and the specific research questions (du Plessis, 2019).

Before ranking the Q-sample statements based on the degree of (dis)agreement, the respondents are requested to divide the statements into three piles: agree, disagree, and neutral (Coogan & Herrington, 2011; Gauttier, 2019). This process familiarizes the respondents with the statements, and the respondents are allowed to reconsider the grouping when the respondents rank the statements (Gauttier, 2019). Subsequently, the physical Q-sorting process consists of each respondent (P-set) rank-ordering the Q-sample to create a Q-sort (as the final array of Q-sample statements) (Stickl et al., 2019). During the Q-sorting process, the respondent’s internal frame of reference is embedded into the responses; thus, the respondent’s personal experiences and subjective logic are fully engaged (Dujardin et al., 2018).

There are two ways in which the Q-sample statements can be sorted. The two notable types of Q-sort processes are free-distribution and forced-distribution. As the name suggests, in free-distribution, the respondent can rank the card anywhere on the Likert scale based on their degree of (dis)agreement (du Plessis, 2019). Alternatively, forced-distribution requires the respondents to sort the Q-sample statements based on a pre-set grid on the Likert scale, as illustrated in Figure 1 (du Plessis, 2019).

After the Q-sample statements have been ranked through the Q-sorting process, the researchers will have to collect supporting information from the respondents by requesting open-ended comments (Gauttier, 2019; Stickl et al., 2019; Watts & Stenner, 2005). One way of doing this is through brief post-sorting interviews to investigate: (1) how the respondents interpreted the items that they ranked specifically high or low, and what the implications are in the context of their overall attitude or viewpoint; (2) if there are any items the respondents would have liked included in the Q-sample, and why; and (3) if there are any further comments from the respondents’ side (Watts & Stenner, 2005). These open-ended comments are of great importance as it...
will aid the "later interpretation of the sorting configurations (and viewpoints) captured by each of the emergent factors" in Step 5 (Watts & Stenner, 2005, p. 78).

The project was conducted in rural communities and for logistic and ergonomic purposes the Q-sorting was done using magnetized Q-sample statement cards, as well as magnetic boards. The Q-sorting process was conducted twice, which is not the norm for Q. The first Q-sorting took on the form of free-distribution, with a P-set of 51 respondents; the second Q-sorting took on the form of forced-distribution with a P-set of 25 respondents. During both Q-sorting processes, the respondents were instructed to sort the Q-sample statements based on the respondents’ attitude regarding the statements by means of a Likert scale ranging from Strongly Agree (+3), Agree (+2), Slightly Agree (+1), Neutral (0), Slightly Disagree (−1), Disagree (−2), to Strongly Disagree (−3). It must be noted that the Likert scale range was presented using infographics and color-coding because the respondents had various levels of education, and it could not be assumed that all respondents have the capacity to read or understand the numerical range of the scale. In cases of illiteracy, the researchers assisted the respondents and read the Q-sample statements out loud to enable sorting as needed. After each Q-sorting, the respondents were subjected to a post-sorting interview whereby open-ended comments were elicited. These interviews were recorded, transcribed, and translated (as necessary).

**Step 5: Analysis and Interpretation**

The final step in the Q process is the analysis and interpretation of the Q-sort as the product of the Q-sorting process. The placement of the Q-sample statements during the Q-sorting is recorded and used as input data for the factor analysis (Gauttier, 2019). A free software program (PQMethod 2.11) and instruction manual are available to facilitate the factor analysis, which will disseminate the similarities between the respondents’ Q-sorts (Coogan & Herrington, 2011; Hagan & Williams, 2016). The respondents will load significantly on the same factor based on similar rankings of the Q-sample statements (Coogan & Herrington, 2011; Previte et al., 2007). The factor analysis will reveal a grouping of Q-sample statements that will express the subjective view of the respondents who loaded significantly on the identified factor (Coogan & Herrington, 2011; Gauttier, 2019; Previte et al., 2007; Zabala, 2014). In the end, the researchers are presented with a “map of subjectively expressed, socially organised [sic] semantic patterns of how participants conceptualise [sic] or think about an issue” (Previte et al., 2007, p. 140). The factors can be analyzed using the factor analysis and the post-sorting interviews.

The factor analysis of the forced-distribution Q-sort yielded five separate factors for the project, as illustrated in Table 1 (Jooste et al., 2018). The factors were interpreted in conjunction with the post-sorting interview data to gain more insight into the factor analysis. These factors showed a tendency for religious and collectivistic modes of reasoning (cf. Jooste et al., 2018). The five factors accounted for 58% of the variation in the Q-sort. Factor 1 contributes 20% to the variance, Factor 2 contributes 12%, Factors 3 and 4 contribute 10% each, and Factor 5 contributes 6%. For more detailed results, refer to Jooste et al. (2018), Schuman et al. (2018), and Terblanché-Greeff et al. (2018).

An additional research step (or phase) were implemented for the SANCOOP: Climate & Beliefs project to ensure that the results produced during the statistical analysis, indeed, matched the beliefs of the participants. Accordingly, eight respondents were identified as loading significantly on the five factors; and the statements of the five factors were written as five separate worldview narratives (Jooste et al., 2018). Thereafter, the eight respondents were presented with the five worldview narratives and were requested to identify the worldview they mostly related to (Jooste et al., 2018). Responses were recorded and interview statements were analyzed qualitatively. This verification step was especially important in the Climate and Beliefs study, since the worldviews of the researchers differed significantly from that of the participants in most cases. This meant that extra caution had to be exercised to limit researcher bias during the interpretation of the Q-sample statements. By asking high-loading participants whether they recognize the worldview narratives, the researchers could ensure that the voice that was heard came from the participants, without undue influence.

**Advantages of Q-Method**

The use of Q-methodology has various advantages. Firstly, Q applies an abductive approach, which has exploratory- and
Table 1. Five Factors of the SANCOOP: Climate & Beliefs project (Jooste et al., 2018, p. 6).

Factor 1: Naturalist collectivist
Climate change is nature’s way of reshaping itself. It’s part of our daily life and influences us emotionally as well as our environment via the growth of crops and production of food. The problems caused by climate change should be addressed now to prevent future disaster. We can do it by coming together and discussing it. I feel strongly that climate change is not a punishment for our sins, nor is it caused by traditional healers or the fighting of the ancestors. Educating people will not cause bad luck or anger the ancestors.

Factor 2: Religious (contradictory in terms of human agency)
God is in control of everything and he created the climate (it is not affected by traditional healers or fighting of the ancestors). There’s nothing wrong with the climate, it is natural and unpredictable. Our behavior [sic] has no influence on it, but we have to respect the environment. It was better in the older days and returning to those ways (living closer to nature and others) might improve the situation. At the same time, I do believe technology can have an influence. I also strongly believe that young people can teach older people about the climate. I am open to change my beliefs and learn more.

Factor 3: Religious determinist
God is in control of the climate, but we as humans have a big influence on it: fossil fuels and pollution are related to climate change. It is a problem, because climate influences our crops and food production—it plays an important role in our lives. The climate was better when I was younger and the next generation will have it even worse than we do today if we don’t do something about it now—it is not the government’s responsibility. To change beliefs is difficult. I am convinced of my beliefs and the only way that I will change it is if I see proof to the contrary. Climate change may be a sign that the world is ending but maybe we can fight it with technology.

Factor 4: Activist collectivist (technology/human)
The climate is definitely changing and it is because of the burning of fossil fuels and pollution, we ought to switch to sustainable technologies. Everybody has the right to know about these issues. We should stand together and unite. It is people who just want to make money that harms the environment. Climate change is not a sign that the world is ending and population growth does not affect it.

Factor 5: Structural (contradictory in terms of time)
I’m open to change my beliefs; we learn new things all the time. We have to find solutions to climate change, because the climate plays an important role in our lives: laws to protect the environment should be drafted and the government must give people information about climate change. The next generation won’t be influenced by our behavior [sic] today. It will not help to return to the ways of the past, young people can rather help older people to catch up on knowledge regarding climate change. Because of their beliefs, it might be difficult to educate some people. The climate is complicated and unpredictable. It’s possible that traditional healers can cause climate change.

The South African Context

South Africa is one of the more multi-cultural countries in the world, and this cultural diversity is epitomized by the title “Rainbow Nation” (Iacob & Dumitrescu, 2012; Naidoo, 2011). In 2016, South Africa had an estimated population of 55.6 million individuals, which is represented mostly by four distinct population groups: Black African, White, Colored, and Indian/Asian (Stats-sa, 2017). Multi-cultural South Africa boasts with 11 official languages. Seven of the languages are of Bantu origin (isiNdebele, isiXhosa, isiZulu, Sesotho sa Leboa, Sesotho, Setswana, siSwati, Tshivenda, and Xitsonga) and two languages are of the Germanic language family (Afrikaans and English).

Based on the country’s mixed ancestry, it comes as no surprise that diverse worldviews will be present in the South African context. The traditions of the various ethnic groups differ, with one example being the values and norms pertaining to social relationships and the self as located in the cosmos (Janse van Rensburg, 2017). More specifically, Janse van Rensburg (2017) supportively explains that the traditional African worldview promotes collectivistic values,
whereas the Western secularized worldview promotes individualistic values.

In addition, there are many economic discrepancies across different social classes (Iacob & Dumitrescu, 2012). These economic discrepancies also lead to discrepancies in levels of education. Accordingly, more urban provinces in South Africa will have a higher level of literacy (e.g., Gauteng at 87.5%), compared to the lower literacy of more traditional provinces (e.g., North West province at 71.7%) (Stats-sa, 2017).

**Alterations and Considerations**

The project used rural communities as the sample pool when conducting research that utilizes Q-methodology in the South African context. Based on the rural status of the communities, low economic income and high levels of vulnerability are prevalent; additionally, rural communities might present with more traditional beliefs as opposed to high levels of secularization (Jooste et al., 2018; Terblanché-Greeff et al., 2018). That being so, the SANCOOP: Climate & Beliefs project expanded on the more typical methodology used in Q-studies. With the following section, we will present a summary of the research alterations as it pertains to the project, as well as some of the considerations to be taken into account when conducting research in the rural South African context.

**Two Concourse Questions**

A concourse is normally based on a single question, which will guide the information collected that will make up the concourse. The methodology used in the project was unusual, in that two different questions were used to form the concourse. More unusual is the fact that the two posed questions pertain to two different categories as the first question asks about opinion and the other asks about behavior. The motivation for the two questions stems from the two main themes of the study: climate change beliefs and adaptation—here, the former pertains to the opinion category and the latter to the behavioral category. The idea was not only to test for the point of view of the participants regarding climate change, but also whether their point of view is “flexible” and ultimately whether this flexibility translates to improved adaptation. Thus to cover both themes of the study adequately in the concourse, two questions were posed during the interviews.

**Language Differences Between Respondents and Researchers**

In South Africa, it is not uncommon to find that individuals are multilingual. During the project, various levels of education, and subsequently, English language proficiency were exhibited by the respondents. As a result, the climate change jargon had to be explained in some instances—this was a prominent and potentially problematic phenomenon during the concourse interviews. On the one hand, ideally participation in the research should be free from hermeneutical injustice against the participants, on the other hand, any “explanation” of terms by the researchers could introduce researcher bias into the concourse. It is imperative that this matter is dealt with very carefully. The collection (recording) of additional qualitative data (i.e., follow-up questions to elucidate the meaning of participants) is an example of strategies that can be followed in such cases. The need for explanations of terms does not mean that the respondents could not contribute to the concourse; it merely means that different wording might have different meanings in various languages and that this needs to be taken into account to establish the concourse responsibly. Special attention should thus be allocated to linguistics when interviews are conducted, as well as during the transcribing and translation processes.

Translation of interviews can be outsourced to a professional body for quality assurance purposes. The caveat being that outsourced services tend to be expensive and can take a long time to complete, especially in cases (such as traditional African languages) where limited professionals are available to provide the needed services. As such, adequate budgeting and time allocation should be included in the project plan when translation services have to be utilized.

Another consideration is the contextual knowledge of the researcher/s who identify the Q-sample. Regardless of the fact that all transcripts were finally presented in English-format for the project, the researchers still had to have some sense of what was being *said* versus what was being *meant*—semantics are thus important. This requires a level of cultural intelligence, which is developed through exposure to various cultures in South Africa. As the research team was represented by South African and Norwegian researchers with functional division, it was imperative that at least one South African researcher was involved in the Q-sample development process.

**Time Usage**

Different cultures have different conceptions of time; and this is a very important consideration when conducting research in the African milieu. In some African cultures, time is often regarded as concrete (event-time), rather than abstract (clock-time). This means that time schedules need to be flexible, in order to accommodate respondents showing up late (or not at all). Additionally, it was not surprising that some of the interviews had extended durations. It was anticipated that the interviews would be 15 to 20 minutes each, but the longest interview that contributed to the concourse lasted up to 70 minutes. Here, the focus was not on the scheduled research timeframe, but on the event, which had to come to a
natural end instead of being dictated by the clock. As such when conducting research in African settings, interviews should not be rushed and should run its due course to avoid disrespecting the respondents and their way of time usage.

**Free-Distribution Versus Forced-Distribution**

Since the project was using Q-methodology in a new context (rural South Africa), the Q-sorting process was attempted using different distributions. First, the respondents were instructed to rank order the Q-sample statements based on free-distribution conditions. Interestingly and contrary to expectation, the Q-sorts were not able to correlate and no clear factor structure presented itself, using this type of distribution. Subsequently, the researchers arranged a second Q-sorting phase, where the respondents were instructed to rank order the Q-sample statements based on forced-distribution. Based on the data from the forced-distribution Q-sorts, a 5-factor array could be successfully extracted.

The fact that the free distribution Q-sorting did not present clear factors is most unusual. One would expect distribution effects to be inconsequential (cf. Brown, 1980 for a more detailed discussion). In other words, using free distribution or forced distribution should not make a noticeable contribution to the specific factors which might emerge (Watts & Stenner, 2005). However, in the case of this study, the type of distribution did seem to influence the emergent factors, with the free distribution not yielding meaningful correlations. Thus, due to the potential for the lack of correlation when utilizing free-distribution in the South African context, it is recommended that future Q-sorting takes the format of forced-distribution.

**Community Feedback Session**

The respondents of the project were of various levels of formal education. As a result, some of the respondents identified the need for information regarding climate change and adaptation to better motivate behavioral changes (Terblanché-Greeff et al., 2018). This expressed need for education motivated the researchers to provide the respondents with the requested information. As such, a community feedback session was facilitated, whereby climate change and adaptation information was disseminated to the interested respondents.

It is interesting to note that the use of Q instigated a situation where the researchers could collect information from the respondents, but also provide the respondents with the requested information on climate change and adaptation. There was thus a two-way flow of information. As the community feedback session was held after the concourse interviews and Q-sorting, the respondents’ subjectivity remained uninfluenced by the new information during the normal Q process. The feedback session proved most useful, as it provided an education opportunity that could be based on the respondents’ needs as opposed to a predetermined feedback session based purely on the results of the study. Furthermore, it supports collaborative knowledge construction between researchers and the community.

**Implications for Climate Change Education**

The data gathered by means of Q-methodology, could potentially facilitate climate change education and inform educational strategies. In the first place, community engagement via Q-methodology resulted in an expression of need from the community for further education about climate change and adaptation. This could possibly be explained by a combination of methodological factors. For example, the way in which the condition of instruction is formulated to respondents, aims to limit contamination of the respondents’ views by researcher bias, that is it is not imbued with a priori meanings. It follows that the respondents have to assign their own meanings—give opinions in their own “voice.” Concomitantly, respondents are interviewed individually and they do not confer about possible meanings with other respondents. This means that respondents are free to interpret the condition of instruction without interference of the processes of consensus formation or policing by community opinion formers. The effect of the above methodological factors seems to be that respondents become aware that their own opinion forms part of a divergent concourse and subsequently begin to wonder about their particular contribution and place in the broader epistemological landscape. This might lead to a desire to find more information about the topic at hand, expressed as a need for education.

In the second place, since Q-methodology aims to elucidate the concourse around a particular topic, it is expected that it will yield an understanding of the different viewpoints that constitute the prior knowledge (before education) in a particular community. By means of such a determination, it is possible for educators to plan educational interventions more efficiently. This is particularly important in settings where there may be seemingly incongruent epistemologies in play, that is by introducing scientific knowledge about climate change into a milieu of traditional or indigenous knowledge. By carefully aligning the integration of new knowledge with the existing knowledge systems in a community, it could be possible to affect belief revision without running into mechanisms of reactionary resistance, while at the same time promoting epistemic justice by inclusive knowledge production.

Thirdly, Q-methodology seems to lend itself to educational strategies that view knowledge formation in social constructivist terms and these types of strategies might be particularly suited for use in communities with strong collectivist leanings. In these types of communities, the participatory nature of the method seems to be well understood and appreciated.
Incidentally, an often overlooked aspect is popular scientific dissemination of the project results to the communities that formed the study population. Q-methodology assures that respondents are informed of the intermediate results by the last step of the method, where respondents are given the opportunity to select whether they agree with the factors that were identified in the results. Subsequently, by giving community feedback of the final project results, the participation in the experiment itself, can become a learning experience.

**Contribution to Mixed Method Research**

The unique nature of the study object of this research necessitated a mixed-method investigative approach. The study set out to find evidence, not only of the fundamental beliefs held by individuals and communities, but also whether an amount of flexibility was inherent in these belief systems. In this sense, the study not only had to rely on the mixed nature of Q-methodology by harnessing both quantitative and qualitative legs of the method, but also further combined this with techniques of transcendental philosophical analysis. The result of this mixed methodology was that the researchers were able to access the fundamental beliefs of the respondents while preserving epistemic justice across the incongruities between the perspectives of the researchers versus respondents. This allowed the research results to have value for use in climate change education in rural communities by facilitating worldview-based education. In this article, the construction of the aforementioned mixed methodology is explicated.

**Conclusion**

For this paper, Q-methodology was illustrated in practical application in the context of rural South Africa. Q is not prescriptive and rigid in its use, and in some instances, Q can be expounded on by adapting research steps to the requirements of the research context. This flexibility is highlighted by the instances during the project that required some alteration to the typical Q research structures. By altering some of the research steps, the project was able to successfully investigate the link between belief systems flexibility and climate change adaptation in rural South Africa.

In conjunction with the alterations, some considerations are posed that might be useful when conducting Q research in the rural South African context. Furthermore, a need for more information regarding climate change and adaptation was voiced by the respondents during the project. As such, the last and most prominent consideration that was unpacked was that Q might be used to facilitate education in the South African context.

**Appendix I**

**Q-Sample**

1. The climate is a natural part of the world we just have to accept and live with.
2. The climate is complicated.
3. The climate is unpredictable.
4. The climate is not changing.
5. There is something wrong with the climate.
6. Climate change is not a sign that the world is ending.
7. Natural disasters happen when nature wants to reshape itself.
8. The climate is determined by God.
9. Climate change is not punishment for the sins that people commit.
10. Climate change is caused by the fighting of the ancestors.
11. Traditional healers cause the climate to change.
12. The climate is affected by the behavior of people.
13. Increasing population growth causes climate change.
14. Climate change is not caused by technology.
15. Climate change is related to the burning of fossil fuels and pollution.
16. The climate influences the growth of crops and the production of food.
17. People are trying to make money, that’s why they are damaging the environment.
18. The climate was not better when I was younger.
19. We can solve environmental problems by returning to the ways of the past.
20. The next generation will be influenced by our current behavior toward nature.
21. We must act now to prevent the climate problems of the future.
22. Young people can help older people catch up with new knowledge about the climate.
23. We have the right to know about climate issues that affect us directly and indirectly.
24. Educating people about climate change will anger the ancestors and cause bad luck.
25. It is not the duty of the government to inform people about climate change.
26. We can address climate problems by drafting laws that protect the environment.
27. We can solve climate problems when we stand together and unite.
28. It is possible for humans to control the climate through technology.
29. Using sustainable technology is not good for the climate.
30. It is difficult to care about climate change because of economic pressures.
31. The climate does not play an important role in our lives.
32. We do not have to respect the environment.
33. It is difficult to educate people about climate change because of their beliefs.
34. It is possible to change my beliefs when someone else tells me to.
35. In order to change our beliefs about the climate, we must sit down and discuss the matter.
36. My beliefs can change if I see in reality that things are different from my beliefs.
37. My beliefs about the climate can change when mechanisms are in place to protect us.
38. I am open to change my beliefs, because I learn new things all the time.
39. It is not possible to change my beliefs.
40. The climate influences how people feel emotionally and that may cause changes in their beliefs.

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