A review of applications of the repertory grid technology in research on education and educational psychology

Accepted 3rd October, 2007

ABSTRACT

The present study utilized a methodological review to construct a model explaining the possible applications of the repertory grid technique (RGT) in research on education and educational psychology. Basically, the RGT is a method usually used to elicit and explore subjects’ personal constructs. It allows integrations of both qualitative and quantitative methods for data collection and analysis. Recently, the development of RGT computer programs extends its applications. First, the analytic strategies of RGT helps to explore internal structures of grid data using systemic strategies which enables researchers to examine subjects’ cognitive structures, usually seen as a complex task, in a more structured way. Second, these analytic strategies could also be used for other purposes, such as exploring the learning problems (or misconceptions) of novice learners, revealing the structure of text data, and constructing principles based on data collected from persons regarded as experts. Moreover, the RGT allows for comparison analysis which provides subjects with opportunities to review and reflect on the changes in their knowledge structures before and after instruction. This comparison analysis also enables researchers to investigate similarities or differences among the collected constructs across individuals. We expect that our discussion of RGT applications can provide new information for researchers to deepen and extend their investigations in the given field.

Key words: Kelly’s repertory grid technology, research methodology, literature review, education, educational psychology.

INTRODUCTION

In education and educational psychology research, the repertory grid technique (RGT) has been shown to be a fertile instrument for eliciting subjects’ personal knowledge, making generalizations, and identifying hidden dimensions within subjects’ knowledge (Ben-Zvi Assaraf and Orion, 2010; Ben-Zvi Assaraf et al., 2012; Edwards et al., 2009; Jankowicz, 2004). The RGT was created by George Kelly (1955), a psychologist and educator best known for his theory of personal construct psychology (PCP). Kelly believed that every individual constructs their personal experience and knowledge through a series of processes including the generation and testing of hypotheses, followed by decisions as to what should be reserved, revised, or abandoned (Bradshaw, Ford et al., 1993; Edwards et al., 2009). The RGT was mainly used in clinical settings at first, as a means of facilitating psychologists’ interpretations of how clients view and shape their worlds, but applications of the RGT have been extended to other areas over time. The development of relevant computer programs in recent years (e.g., Idiogrid, Gridcor, Gridsuite, Planet, Webgrid, and so on) has enabled the RGT to be used in dealing with complex and multiple types of data. A number of statistic analytical approaches, such as descriptive statistics analysis, principal component analysis, and cluster analysis, have thereby been integrated into the analysis of the RGT, providing
researchers with a systematic way to explore subjects’ cognitive structures. Even so, we consider the RGT as simply not a mainstream research method in education and educational psychology research, because a July 2016 search of various educational databases (e.g., JSTOR, ERIC, EBSCO) for articles using “repertory grid” in the title or as keyword revealed a total of only 55 relevant studies over the last 30 years. Among those 55 studies, 39 empirical studies were selected as the main materials for our literature review in the present study. The first concern of our review was to determine the research purposes of the various studies. Relatedly, we intend to clarify what kinds of research purposes applications of the RGT are appropriate for. However, we found the research purposes of the studies in question to be quite diverse, which required further clarification of the research topics, the methods used for data collection and analysis, and the features of the study participants (e.g., grade levels and prior knowledge) in order to improve our understanding. Specifically, the main purpose of our literature review was to assist readers/researchers in the creation of future research purposes to allow for deeper investigations in their given fields based on the RGT methodology. As a result, we constructed a model to illustrate the conclusions of our literature review (Figure 1). The center of the model shows the main concern of the present study, namely, the features of research purposes appropriate for the RGT. The three squares in the first outer layer of the model indicate three basic features of RGT-related research purposes. The squares in the second outer layer show subclasses of the three basic features.

The sections which follow were organized according to our model. Table 1 presents a summary of the information for each of the empirical studies reviewed in our literature exploration.

Elicitation and interpretation of personal knowledge

Understanding subjects in terms of their pre-existing knowledge

The standard methods used in applying the RGT basically include five phases: a) selecting elements; b) eliciting constructs; c) establishing a repertory grid (RG); d) rating the RG; and e) analyzing the rating data in the RG. Based on Kelly’s theory, elements could be cases, objects, things, ideas, topics, or concepts. The purpose of these elements is to elicit subjects’ knowledge, understanding, attitude, personalities, and thinking on the topics of research. The basic strategies of elicitation include requesting subjects to make classifications, identifications, reasonings, and explanations (Kreber and Klampfleitner, 2012; Greatorex, 2001). For example, Kelly (1955) investigated subjects’ personalities by having them classify a set of concepts as follow: self, mother, father; your closest friend of the same elements, and they are used as stimuli to elicit subjects’ constructs. According to Kelly, a construct is an invention of a person, and hence it is personal and private. Different from elements, constructs reveal a subject’s pre-existing knowledge. The method developed by Kelly best-known for eliciting personal constructs is called the triadic elicitation method (Eping et al., 1971). Generally, there are three phrases included in the triadic elicitation method: (a) the selection and grouping of elements in three as a triad; (b) asking the subject to explain how two elements of a triad are similar to each other and, therefore, different from the third one; (c) repeating the elicitation process using different triads. Through the triadic elicitation method, researchers are able to explore subjects’ personal constructs with little intervention on the part of the researchers (Van Kan et al., 2010). A number of past studies applied the triadic elicitation method to elicit subjects’ personal knowledge and understand the ways in which they perceive the given elements. Guo et al. (2011) employed the triadic elicitation method to explore university students’ thinking and attitudes regarding computer-mediated communication (CMC) mediums. The elements selected and used in the study were communication mediums, such as email, instant messaging, wikis, blogs, social networking sites, and so on. After students’ comments and thoughts were collected, content analysis was applied for further exploration. The authors reported that the RGT provided them with an effective way to identify a number of student-specific reasons regarding the use of CMC mediums in learning contexts. Ben-Zvi Assaraf et al. (2012) investigated tenth-grade students’ knowledge of human body systems. During the data collection phase, the researchers asked the subjects to brainstorm twelve biology concepts related to human body systems (e.g., breathing, blood cells, and oxygen). These concepts were then treated as elements in the application of the triadic elicitation method. The elements were then supplied to the students to elicit their constructs. Through subsequent content analysis of the collected constructs, the researchers were able to understand how the students constructed their knowledge of human body systems. This understanding helped the researchers, in turn, to develop scaffolds to support students’ learning. In our literature review, it was observed that using content analysis is a common strategy to explore the elicited constructs after the triadic elicitation method. This feature implied a basic application of the RGT.

Exploring the characteristics of constructs

In addition to making interpretations, another common purpose of the analysis of subjects’ constructs is to explore their characteristics. Basically, the investigators have the authority to decide what elements should be selected for elicitation. However, it is suggested that investigators
should pick elements based on the subject’s prior-knowledge (Cohen et al., 2007; Keynan et al., 2014). This consideration enables the investigators to elicit subjects’ knowledge without misunderstanding and also supports the exploration of the characteristics of subjects’ knowledge structures. Kreber and Klampfleitner (2012) applied the RGT to investigate teachers’ conceptions of authenticity in teaching; nine lecturers from different academic fields were invited to participate. Ten characteristics for describing a university teacher were identified through discussions with the subjects, such as a typical university teacher, an effective teacher, and an authentic teacher. These characteristics were then treated as elements for eliciting the lecturers’ constructs regarding authentic teachers, authenticity in teaching, and teaching effectiveness. As a result, the study identified six characteristics of the subjects’ knowledge with regard to authenticity in teaching which provided evidence for further developments in both teacher education and philosophical theories on authenticity. In the study conducted by Ben-Zvi Assaraf et al. (2012), as mentioned above, all elements and constructs were identified and obtained through communications with the subjects. This communication process ensured that all selected elements were meaningful to all students and also supported the subsequent exploration of students’ cognitive structures about their science learning.

**Reveal internal structure of grid data**

**Explore personal cognitive structures**

Although the RGT is a technique for eliciting people’s knowledge, it allows, at the same time, for the integration of statistical analyses. In this regard, investigators may establish a RG, the third phase of the standard methods for applying the RGT we mentioned in last section, in order to collect quantitative data from subjects. There are various methods for establishing a RG, as well as different ways of rating a RG. The most common method is to place elements along the bottom side of a grid, and then put constructs on the two sides of the grid. Such a RG structure enables subjects to rate every pairing of an element and construct by adopting a 5- or 7-point rating scale mechanism. A high score (that is, 5 points or 7 points) is then given if the element and construct in a paring are considered to be closely related.

As soon as the quantitative data are collected, they can be analyzed by a series of approaches, such as descriptive statistical analysis (Aztetkin et al., 2010), cluster analysis (Bencze et al., 2006; Ilin, 2016; Vanfretti and Farrokhabadi, 2013), and principle component analysis (PCA) (Blundell, Wittkowski et al., 2012; Lengnink and Prediger, 2003). These statistics provide investigator with multiple ways to explore the internal patterns of subject’s cognitive
structures. Ilin (2016) investigated a female novice teacher's knowledge of the qualities of an effective teacher. More specifically, the participant was asked to discuss nine persons, that is, three effective, three typical, and three ineffective teachers, respectively, in a semi-structured interview. The nine persons (who were given assumed names) were thus effectively treated as elements to elicit the teacher’s constructs. A RG was then established using these elements and constructs to collect quantitative data. Afterwards, cluster analysis was applied to reveal the structure of the RG data, which helped the researcher explore the teacher’s knowledge structure regarding the qualities of an effective teacher. Vanfretti and Farrokhhabadi (2013) applied the RGT to investigate university students’ opinions regarding their engineering curriculums. Nine elements that had the largest impact on the students’ learning approaches were identified in the study, such as final exams, weekly tests, test solutions, and so on. As soon as the RG and the rating of the RG were completed, cluster analysis was applied to reveal the students’ knowledge structures, which provided the researchers with insights to explain how the students saw their courses, as well as what modifications should be made to improve their learning. Like cluster analysis, PCA is a statistic analytical approach that has often been integrated into RG analysis to explore individuals’ cognitive structures. The layout of PCA produces a 2-dimensional space in which all the elements and constructs are mapped according to the scores given to each pairing in the RG by a study’s subjects. That is, the layout of PCA reveals the subjects’ cognitive structures and implies how the subjects interpret the given topic (Luk and Shek, 2006; Ralley et al., 2009; Tan et al., 2013). Blundell et al. (2012) applied PCA of the RGT to investigate nursing staff members’ attitudes toward their patients who have mental health problems. The elements set in the study consisted of the patients with various types of mental health problems, while the constructs consisted of the staff members’ views of them. After a RG was built and the RG rating was completed, PCA was applied by the investigators. The layout of the PCA revealed every relationship among the elements and constructs on a 2-dimensional map, providing the investigators with evidence to explain the staff members’ perceptions regarding their clients. A similar PCA approach was also applied by Partridge (2012) to explore staff members’ experiences of emotional well-being in a pastoral secondary school. These authors reported that both cluster analysis and PCA provided highly valuable analytical results.

**Identifying principles based on experts’ knowledge**

The participants in the studies utilizing RGT methodology provided as examples above share a common feature. That is, most of these participants were novices in the given field, such as students, patients, and novice teachers. We understand that the authors of these studies, then, were trying to understand the participants in their studies, in order, for example, to help them to solve their mental problems or obtain better knowledge and skills after instruction. In contrast, however, some researchers purposefully choose experts as the participants in their studies (Fischer et al., 2012; Gupta et al. 2010; Jordan and Persson, 2007; McGregor, 2014). These researchers are expected to identify principles or to construct a theory relevant to a given field based on these experts’ abundant knowledge and experience. For example, Jordan and Persson (2007) invited 20 professionals (experts) from a variety of different professional backgrounds and a wide age range to participate in a study. These experts’ thoughts on various types of technological products were collected through the triadic elicitation method. Four categories of the experts’ thoughts were then clarified through follow-up content analysis. The results enabled the investigators to identify principles for the design of positive affective technological products. Gupta et al. (2012) identified expert opinions on factors influencing societal responses to developments and applications of nanotechnology. A number of experts from various professional fields, such as material science, polymer technology, cosmetics, food, and so on, were invited as participants. Their constructs were collected through structured interviews and then analyzed by PCA of the RGT, which enabled the authors to identify the relevant characteristics of nanotechnology with regard to its development and application. Generally, a main purpose of the integration of statistic analytic approaches in the data analysis of the RGT is to reduce the complexity of the RG data, which helps to reveal the internal structure of said RG data. Such approaches enable investigators to explore subjects’ personal cognitive structures or identify important features among the collected constructs.

**Making comparisons among constructs**

**Improving learning reflections**

Alban-Metcalf (1997) reported that there are two approaches for applications of the triadic elicitation method: the static approach and the dynamic approach. The former approach elicits perceptions held by a subject at a specific point in time (e.g., Suto and Nadas, 2009), while the latter repeats the elicitation to indicate changes of perception over time (e.g., Ben-Zvi Assaraf and Orion, 2010). Thus, the dynamic approach is a kind of comparative approach used in analyzing subjects’ cognitive structures. This approach has been widely used in research on education and educational psychology (Bezzi, 1996; Ben-Zvi Assaraf and Orion, 2010; Chitsabesan et al., 2006; Henze et al., 2007; Luk and Shek, 2006; Kuipers and Grice, 2009; Hopper, 2000; McGregor, 2014; Touw et al., 2015).
One reason for this widespread use is that such a comparative approach emphasizes subjects’ learning and learning reflections. Bezzi (1996) applied the RGT to investigate students’ perceptions of geology. Bezzi supplied the students with all the layouts of a cluster analysis. These layouts revealed the students’ own cognitive structures and those of their peers, which enabled them to engage in reflections on how they perceived the given topic, what they knew, what they had experienced, and how they had changed after instruction. Moreover, students were also encouraged to identify similarities and differences between their own knowledge structures and those of others, communicate their understandings with others, and generate arguments for defending their positions. In Luk and Shek’s (2006) study, changes in the self-identity systems of nineteen ex-mental patients before and after a holistic psychiatric rehabilitation program were investigated. To examine the changes, the study applied PCA and took the three most important elements (the ideal self at present, an ideal ex-mental patient, and an unsuccessful person) as reference points when the PCA layout was analyzed. Such a design and analytic strategy enabled the investigators to have specific targets to explore with regard to changes in the patients’ self-identity systems, which helped the investigators, in turn, to know how to facilitate their patients in making improvements. Wu et al. (2011) developed a grid-oriented clinical learning program for nurse training. The program was integrated into mobile devices as a personal digital assistant, which enabled users to record what they saw during clinical diagnoses. Fundamentally, it enabled the users to engage in reflections by comparing their own observations across time. Tobacyk (1987) and Mayo (2004) investigated students’ learning in a psychology history course with the RGT. In the grid rating phase, they requested that all the participants share, compare, and seek differences in their rating scores, discuss the reasons for each rating, and justify their scores using arguments. As Mayo (2004) pointed out, “the observed outcomes of the end-of-semester, whole-class discussion in the RG condition lend additional support to students’ perceptions that RGT encouraged conceptual understanding and active involvement in learning” (p. 180). McGregor (2014) investigated differences in the auditory experiences of expert and non-expert listeners. To do so, McGregor developed a RG to collect quantitative data from both expert and non-expert listeners. Follow-up comparison analyses showed the percentage difference for each compared object. These results provided the researcher with evidence to explain what makes a listener an expert. The RGT supports subjects’ learning reflection which is important in researching education and educational psychology. A researcher may request subjects to share their thinking about how to assign a rating during a grid rating activity in order to improve their learning reflection. Furthermore, it may also be appropriate to supply the subjects with the RGT analytic results regarding their own, their peers’, and their instructors’ cognitive structures to engage in reflection. These strategies reveal that the RGT is a method that could be applied appropriately in research on education and educational psychology.

**Evaluation of contents and meanings of text data**

Recent studies concerning text analysis have mainly dealt with the value of the contents and meanings conveyed by both the images and words of texts (Snyder and Broadway, 2004; Stern and Roseman, 2004). A number of studies adapted the RGT for this kind of analysis because of its systematic procedures for data collection and evaluation. Suto and Nadas (2009) applied the RGT to analyze the math and physics questions on past General Certificate of Secondary Education (GCSE) examinations. The focus of the analysis was to explore features which would yield differing marking accuracies among these questions in GCSE examinations. In the RGT setting, the elements consisted of questions included in the GCSE examinations, while the constructs consisted of comments obtained through the application of the triadic elicitation method with experienced examiners. Content analysis was then applied to explore the content of the collected comments. Then, the study identified a number of features of the exam questions that would affect a marker’s marking accuracy. Greatorex (2001) applied the RGT to develop grade descriptions for an international economics syllabus. Two economics experts were invited to evaluate three scripts provided by three candidates with different degrees of mastery in economics. These scripts were treated as elements for use in the triadic elicitation method in order to collect these experts’ explanations of what distinguishes performance at one level from performance at another. Follow-up content analysis enabled the study’s author to construct a framework in which the knowledge and skills required for performance at each level of economics were described in detail. Hu et al. (2003) explored science curriculum components favored by high school students. Six components that were emphasized in a new biology curriculum were selected as elements of the RGT (e.g., problem solving skills, scientific concepts, social/ethical issues, and so on). Then, those elements were employed in the triadic elicitation method to collect student thoughts regarding their own comments, as well as the reasons for their preferences for those elements. Follow-up content analysis and descriptive statistics provided the researchers with evidence on the basis of which they could then provide suggestions for both the implementation of the current curriculum and the development of future science curriculums.

**DISCUSSION**

The RGT is a research method with mixed analysis
techniques that has usually been used to elicit and interpret subjects’ personal knowledge. As a researcher, it is important to know the pros and cons of the various applications of the RGT before using it. Past studies have reported some factors that might influence the reliability and validity of different applications of the RGT, such as the complexity of construct and element (Kelsall and Strongman, 1978; Keynan et al., 2014) and the prior knowledge of the participants (Caine and Smial, 1969; Lansdown, 1975). In some cases, the selected constructs may not be applicable to all the selected elements, which may cause the RG to fail to capture the subjects’ inherent understanding (Vanfretti and Farrokhabadi, 2013; Suto and Nadas, 2009). To improve the reliability and validity of applications of the RGT, it is suggested that investigators take participants’ opinions into account during the selection of elements and constructs in establishing a RG (Cohen et al., 2007; Keynan et al., 2014; Latta and Swigger, 1992). Moreover, RGs often cannot be used across individuals because the components (elements and constructs) of a RG usually come from a single person, such that a given RG is effectively private in nature. Such limitations can be resolved by establishing a universal/public RG in which all the components (elements and constructs) are collected through discussions involving all the participants (McGregor, 2014; Mayo, 2004; Tobacyk, 1987). This enables researchers to compare subjects’ cognitive structures across individuals. Based on the summary of Table 1, it is no doubt that the RGT can be applied for various research purposes with regard to exploring subjects’ cognitive structures. This does not mean, however, that the RGT can only be used to analyze a subject’s personal knowledge. That is, there are a number of aspects contained in a single individual’s cognitive structure, such as knowledge, attitudes, and aspects of various skills. Regrettably, however, few studies have applied the RGT to explore subjects’ attitudes and skills (Guo et al., 2011). This could constitute a research gap that requires further investigations. Second, most of the studies we reviewed purposefully invited either students (a kind of novice) or experts to participate as per their research design. Few researchers selected subjects from different cultural backgrounds or with different levels of prior knowledge in order to explore their general understanding regarding a given issue (Kreber and Klampfleitner, 2012; Kuipers and Grice, 2009). Recently, however, the development of computer programs utilizing the RGT has made it easier to support these kinds of investigations, such as studies involving survey research and big data analytics.

### Conclusion

Although the RGT is still not a dominant methodology in research on education and educational psychology, its applications in these fields thus far have been diverse. A basic strategy for using the RGT for data collection is the well-known triadic elicitation method, an interviewing technique that helps to elicit personal perceptions, beliefs, feelings, and attitudes towards a given issue. In our literature review, we found that some researchers selected novices, such as pre-service teachers, students, or patients, as the participants in their studies because they intended to understand these novices’ learning problems (or misconceptions) to help them solve those problems, and improve their learning. In other cases, researchers selected experts as study participants in order to explore the content of their knowledge and experiences, which were typically regarded by the researchers as resources for identifying principles and constructing theories. To analyze collected constructs, the RGT allows integrations of both

### Table 1. A summary of information regarding the application of the RGT for each of the reviewed literature.

<table>
<thead>
<tr>
<th>Authors (Year)</th>
<th>Participants</th>
<th>Topic</th>
<th>Purpose</th>
<th>Strategy of data collection</th>
<th>Strategy of data analysis</th>
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<tbody>
<tr>
<td>Tobacyk (1987)</td>
<td>College students</td>
<td>Education in psychology history</td>
<td>To promote students’ leaning understanding through</td>
<td>Develop a RG to collect students’ rating score.</td>
<td>Descriptive statistics</td>
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<td>Bezzi (1996)</td>
<td>College students</td>
<td>Teaching and learning in geology</td>
<td>To explore students’ cognitive structure regarding the geology</td>
<td>Triadic elicitation interviews</td>
<td>Cluster analysis Comparison analysis</td>
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<tr>
<td>Hopper (2000)</td>
<td>Pre-service teachers</td>
<td>Teacher education</td>
<td>To promote teacher’s knowledge about effective teaching</td>
<td>Semi-structure interviews</td>
<td>Cluster analysis Content analysis</td>
</tr>
<tr>
<td>Hu et al (2003)</td>
<td>High school students</td>
<td>Textbook analysis</td>
<td>To explore components in a newly biology curriculum favored by students</td>
<td>Triadic elicitation interviews</td>
<td>Content analysis</td>
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<td>Authors(Year)</td>
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<tr>
<td>Lengnink&amp;Prediger (2003)</td>
<td>Pre-service teachers</td>
<td>Teacher education</td>
<td>To explore teacher students’ individual conceptions about learning and teaching mathematics.</td>
<td>Triadic elicitation interviews</td>
<td>Line diagram analysis</td>
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<td>Mayo(2004)</td>
<td>College freshmen and sophomores</td>
<td>Teaching in psychology history</td>
<td>To promote students’ leaning understanding</td>
<td>Develop a RG to collect students’ rating score</td>
<td>Descriptive statistics</td>
</tr>
<tr>
<td>Bencze, Bowen and Alsop (2006)</td>
<td>Secondary school teachers</td>
<td>Science teaching</td>
<td>To explore relationships between teachers’ conceptions about science and their strategies for teaching science</td>
<td>Semi-structure interviews</td>
<td>Cluster analysis</td>
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<td>Luk and Shek(2006)</td>
<td>Patients with emotional problem</td>
<td>Psychiatric rehabilitation and holistic care</td>
<td>To promote personal changes of patients after attending a psychiatric rehabilitation program</td>
<td>Triadic elicitation interviews</td>
<td>Principal components analysis</td>
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<td>Chitsabesan et al (2006)</td>
<td>Teachers in medical school</td>
<td>Clinical teaching</td>
<td>To explore relationships between teachers’ high-inference teaching characteristics and the associated low inference teaching behaviors</td>
<td>Triadic elicitation interviews</td>
<td>Content analysis</td>
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<td>Jordan and Persson (2007)</td>
<td>Professionals from a variety of different professional backgrounds</td>
<td>People and products</td>
<td>To investigated the issues that people identify when thinking about various types of products</td>
<td>Triadic elicitation interview</td>
<td>Content analysis</td>
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<td>Henze et al (2007)</td>
<td>Science teachers</td>
<td>Science teaching</td>
<td>To explore the improvement of teachers’ knowledge about teaching models and modeling</td>
<td>Semi-structure interviews</td>
<td>Cluster analysis Comparison analysis (pretest-posttest design)</td>
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<td>Kuipers and Grice (2009)</td>
<td>Novice and expert occupational therapists nursing staffs</td>
<td>Clinical reasoning</td>
<td>To promote occupational therapists’ capacity of clinical reasoning exploring staff beliefs about clients with mental health problem</td>
<td>Triadic elicitation interviews</td>
<td>Comparison analysis (across individuals) Principal components analysis Comparison analysis (across individuals)</td>
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<td>Ralley et al (2009)</td>
<td>experienced examiners</td>
<td>Math and physics education</td>
<td>To identify question features in GCSE examinations that would yield differing marking accuracies</td>
<td>Triadic elicitation interviews</td>
<td>Descriptive statistics Content analysis</td>
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<tr>
<td>Ben-Zvi Assarafand Orion (2010)</td>
<td>elementary students</td>
<td>Science learning</td>
<td>to investigate the change of students’ science concept before and after instruction</td>
<td>Triadic elicitation interviews</td>
<td>Content analysis</td>
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<td>Descriptive statistics</td>
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<td></td>
<td>Comparison analysis (pretest-posttest design)</td>
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<td>Guo et al (2011)</td>
<td>university students’</td>
<td>computers and education</td>
<td>to explore attitude of using computer-mediated communication media</td>
<td>Triadic elicitation interviews</td>
<td>content analysis and cluster analysis</td>
</tr>
<tr>
<td>Wu et al. (2011)</td>
<td>Undergraduate students</td>
<td>Nurse Education</td>
<td>To improve students’ nursing knowledge through a clinical mobile learning system</td>
<td>Students record symptoms and organize their nursing knowledge to construct their own repertory grid during clinical observations</td>
<td>Descriptive statistics t-test analysis</td>
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<td>Greatorex (2001)</td>
<td>Economics experts</td>
<td>Economic education</td>
<td>To develop a grade descriptors to generate assessment rubrics, assignment-specific marking schemes and marking criteria</td>
<td>Triadic elicitation interviews</td>
<td>Content analysis</td>
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<td>Partridge (2012)</td>
<td>Pastoral staffs</td>
<td>Mental health</td>
<td>To explore staff’s experiences of emotional well-being</td>
<td>Triadic elicitation interviews</td>
<td>Principal components analysis</td>
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<td>Gupta et al. (2012)</td>
<td>Experts from a variety of different backgrounds</td>
<td>the applications of nanotechnology</td>
<td>To explore experts’ opinions and knowledge regarding applications of nanotechnology</td>
<td>Triadic elicitation interviews</td>
<td>Principal components analysis</td>
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<tr>
<td>Blundell et al. (2012)</td>
<td>Nursing staffs</td>
<td>Clinical Psychology</td>
<td>To investigate nursing staffs’ attitudes on patients with mental health problems</td>
<td>Triadic elicitation interviews</td>
<td>Principal components analysis</td>
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<tr>
<td>Kreber and Klampfleitner (2012)</td>
<td>University lecturers</td>
<td>University education</td>
<td>To explore teachers’ conceptions regarding the authenticity in teaching</td>
<td>Triadic elicitation interviews</td>
<td>Content analysis</td>
</tr>
<tr>
<td>Vanfretti and Farrokhabadi (2013)</td>
<td>university students</td>
<td>University education</td>
<td>To investigate students’ opinions on their course of engineering</td>
<td>Triadic elicitation interviews</td>
<td>Principal components analysis</td>
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<td>Tan et al. (2013)</td>
<td>Ninth grade students and their English teachers</td>
<td>Language education</td>
<td>To explore acceptance of using digital pen during reading activity</td>
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<td>Tenth grade students</td>
<td>Students’ science learning</td>
<td>To explore students’ knowledge on the human body system</td>
<td>Triadic elicitation interviews</td>
<td>Content analysis</td>
</tr>
<tr>
<td>McGregor (2014)</td>
<td>Designers and listeners</td>
<td>Listening experience</td>
<td>To compare the listening experiences between non-experts and the designers</td>
<td>Triadic elicitation interviews</td>
<td>Cluster analysis Comparison analysis</td>
</tr>
<tr>
<td>Touw et al. (2015)</td>
<td>Student teachers</td>
<td>Teacher education</td>
<td>To explore student teachers’ constructs about their students</td>
<td>Triadic elicitation interviews</td>
<td>Content analysis</td>
</tr>
<tr>
<td>Ilin (2016)</td>
<td>A female novice teacher</td>
<td>Teacher education</td>
<td>To investigate teacher’s conceptualization of an effective teacher</td>
<td>Triadic elicitation interviews</td>
<td>Cluster analysis</td>
</tr>
</tbody>
</table>

The application of the RGT to qualitative and quantitative analytical approaches. Such strategies help to reveal the internal relationships among subjects’ personal constructs in a systematic way. Another feature of the RGT is that it can be applied in comparison analyses. Most of purposes of the studies that we reviewed involving comparison analysis were related to the promotion of subjects’ learning and learning reflections. Strategically, investigators may supply subjects with their own and their peers’ RGT layouts in order to improve their self-awareness. Comparison analysis could also be used in the context of text analyses, including analyses of textbooks, educational objectives, questions on examinations, and so on. It is expected that the model presented in this review can provide researchers with a new vision of how to develop research designs that are appropriate for applications of the RGT.

REFERENCES


