JOURNAL OF BALTIC SCIENCE EDUCATION

ISSN 1648-3898 /Print/
ISSN 2538-7138 /Online/

COMPONENTS OF GEOGRAPHICAL PRACTICE POWER COMPETENCY (GPPC) FOR PRIMARY AND SECONDARY SCHOOL STUDENTS: CONCEPTUALIZATION, CONTEXTS, AND CONTENT

Yanhua Xu,
Zile Liu,
Peiying Lin

Abstract. *Geographical practice power is a key competency essential for students' overall development. It is, therefore, important to understand its concepts, contexts, and content. Practical activities following scientific and operable principles in real geographical situations would enable students to unleash their potential across the curriculum. The primary aim of this study was to design and validate a conceptual, contextual, and content framework for geographical practice power competency (GPPC) of primary and secondary school students in China. The study used a three-step mixed-method research design with expert opinions collected through interviews and questionnaires. The dimensions of GPPC in this study included the mental processes of cognition, awareness, attitude, and behavior. A compilation of the attributes of GPPC for primary and secondary school students was proposed. There was a general consensus among the evaluators regarding the conceptual, contextual, and content framework of GPPC. When the weight values of the four dimensions and sub-dimensions of GPPC were calculated, it was found that they played different roles in the framework. Contrary to the expectation that scientific argumentation would be the most important dimension of GPPC, this study found that information acquisition was rated the most important. In each GPPC sub-dimension, consciousness received the highest weighting.*

Keywords: *geographical practice power competency, primary school students, secondary school students*

Yanhua Xu
Jiangxi Normal University, China
Zile Liu, Peiying Lin
Capital Normal University, China

Introduction

Fieldwork in geography is considered an integral part of the geography curriculum in many countries. For instance, the U.S. National Geography Standards explicitly address "doing geography" and recommend that students go out with teachers to learn (Gallagher & Downs, 2012). In England, competency-oriented fieldwork in geography is part of the curriculum framework (Department for Education, England, 2013, 2014). Similarly, in Australia, geography fieldwork is expected to develop students' skills in observing, questioning, planning, collecting, recording, evaluating/presenting, interpreting, analysis, and summarizing (ACARA, 2015). Curriculum initiatives in these countries emphasize the importance of a curriculum framework for geography fieldwork and a competency orientation of such a framework. By September 2020, geography fieldwork had been incorporated into the curriculum in many countries and regions of Asia, Europe, Africa, North America, and Oceania (e.g., ACARA, 2015; Department for Education, England, 2013, 2014; Gallagher & Downs, 2012; Ministry of Education, New Zealand, 2015; Ministry of Education of the People's Republic of China, 2012, 2018; Department of Basic Education, Republic of South Africa, 2011a, 2011b).

There is a need to consider not only the key competencies that learners should possess when participating in field trips but also the qualities that they already have because these innate attributes can be very significant. For example, the level of engagement, attention, curiosity, and willingness that people show when they are engaging in fieldwork may influence the quality of their work. As mentioned in the International Charter for Geographical Education (1992), geography helps citizens appreciate and understand the world so that they might contribute to solving problems faced by humanity (CGE, 1992). Awareness of and competence in taking action to alleviate or

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

resolve these problems need to be improved through practical training in authentic situations. Moreover, to some extent, the contribution of geography to decision-making is enhanced by certain personal qualities (National Research Council (U.S.), 1997). While the importance of personal qualities for geographical practice activities such as fieldwork cannot be overemphasized, it is unfortunate that currently no geography curriculum has incorporated personal characteristics with regard to such activities, except that of mainland China.

China's geography curriculum standards include geographical practice power competency (GPPC) that encompasses skills and personal qualities (Ministry of Education of the People's Republic of China, 2018), an asset also referred to by some scholars as "acting competence". Although acting competence, to some extent, also embodies "action competence" (Muñiz, et al., 2017), it does not reflect motivation, perseverance, and other personal qualities. Since the term "power" denotes the importance of both personal qualities and competencies in learning power, the term "Geographical Practice Power Competency" (GPPC) is used to describe the learner's motivation, perseverance, and competence in geographical practice, and is recognized as an important component of the geography curriculum (Xu & Lin, 2018). Because of the role of GPPC in developing learners' skills and personal qualities, a number of Chinese scholars have focused their attention on it. Their research on GPPC has seen it being included in curriculum development (Wu, et al., 2019; Xie, 2020; Zhang, et al., 2019; Zhao, et al, 2020), along with the creation of GPPC indicators (Li & Ding, 2019; Sheng & Lu, 2019; Xu & Lin, 2018; Yao & Liu, 2020) and the evaluation of GPPC (Luo & Yu, 2018; Xu & Lin, 2018).

However, in China, given that geography is integrated into the science or the social studies curriculum at the primary level (grades 1–6), and that the regional geography curriculum standards at the lower-secondary level (grades 7–9) are being revised, most research on the conceptualization, contexts, and content associated with GPPC is limited to the upper-secondary level (grades 10–12). The components of GPPC at the upper-secondary level have been analyzed by scholars from the perspectives of conceptualization, contexts, and content (Ding, 2019; Luo & Yu, 2018; Xu & Lin, 2018; Yao & Liu, 2020; Zhang & Scholten, 2019). Little attention has been paid to the mental processes associated with GPPC, such as curiosity, interests, emotions, imagination, and appreciation, and to the weighting of each dimension and sub-dimension of this competency (Luo & Yu, 2018; Xu & Lin, 2018; Zhai, et al., 2018). In terms of research methods, many scholars have drawn from the literature to explore the components of GPPC, while other scholars have adopted a Delphi expert questionnaire to do so (Yao & Liu, 2020). Few studies have used a combination of qualitative and quantitative methods to explore the conceptualization and content of the competency, even though such a design could enhance reliability.

Therefore, in this study, a mixed-method approach was adopted to explore the components of GPPC for primary and secondary school students from the perspectives of conceptualization, context, and content. In the following section, the definitions of fieldwork in geography and GPPC, and a brief discussion of previous research on GPPC are presented.

Literature Review

Concepts of Fieldwork in Geography

Several similar terms exist for fieldwork (e.g., "field studies" or "field teaching"), all sharing a common meaning that indicates work in authentic situations outside the classroom. This concept encompasses "a variety of teaching methods and experiences" (Gold, 1991).

According to current educational literature, three different connotations of "fieldwork" exist, namely "the acquisition of experience" (Davis, 1993; Good, 1973), "a research method" (Boehm & Kracht, 1974; Bogdan & Biklen, 1998; France & Haigh, 2018; Kent, et al., 1997; Rice & Bulman, 2001; Schwandt, 1997; Zhao, 2017), and "a specific educational activity" (Boehm & Kracht, 1974; Bogdan & Biklen, 1998; France & Haigh, 2018; Kent, et al., 1997; Rice & Bulman, 2001; Schwandt, 1997; Zhao, 2017). Within the field of geography, scholars have a similar view of the phrase "fieldwork in geography", basically considering it as a research method, learning activity, and experience (Chen, 1981; Shi, 1989; Wei, 2002). Some scholars have also defined fieldwork as the use of field observations, measurements, interviews, etc. outside the geography classroom or research laboratory to obtain information related to teaching and research (Chen, 1981; Shi, 1989). Other scholars view fieldwork in geography as an important experience in learning the subject (Wei, 2002).


https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Concepts of GPPC

As mentioned earlier, similar to fieldwork in geography, GPPC for upper-secondary school students has three connotations. First, GPPC is similar to fieldwork in geography because it also includes learning activities and research methods. In particular, experimentation, field trips, and investigation are considered important learning activities and research methods in geography. Second, GPPC also consists of experiences, including acquiring information, exploring, problem-solving, planning and implementing geographical practice activities. Third, GPPC is unique in that it explicitly includes personal qualities of individual will and action that one possesses or should have in geographical practice.

The qualities of will and the competencies required to act comprise two aspects of GPPC. The first aspect concerns the qualities of will expressed during practical geography activities, which are endogenous in nature. Luo and Yu (2018) propose that qualities of will include aesthetic interest, will power, and other attributes. Wang et al. (2017) consider them to be the sum of various elements that constitute human will, including independence, self-awareness, decisiveness, self-control, and resilience. Yao and Liu (2020) suggest that qualities of will include attitude, will, emotion, and morality. Sheng and Lu (2019) maintain that qualities of will encompass consciousness, decisiveness, persistence, and self-control.

The second aspect of GPPC comprises competencies required during geographical practice activities (Li, 2017; Luo & Yu, 2018; Sheng & Lu, 2019; Xu & Lin, 2018; Zhai, et al., 2018), which are exogenous in nature. Li (2017) believe that these competencies should include identification of orientation, route planning, disaster prevention and avoidance, and independent survival in the wilderness. Luo and Yu (2018) expand GPPC to include competencies such as reading, observation, communication, ability to operate tools for mapping, geographic production, and geographic technology use. According to Sheng and Lu (2019), GPPC should include ability to use technology for information processing, using tools for practice, design, creation, observation, etc. Xu and Lin (2018) emphasize the importance of spatial orientation, access to and sharing information and scientific argumentation. Zhai et al. (2018) stress geographic charting ability, observation ability, and geographic manipulation ability.

As both qualities of will and competencies for acting are present in learning activities, research methods, and experiences, the Chinese education sector categorizes them as follows:

(1) the ability to collect and process geographical information, which includes (a) methods applied to collect and process geographical information, (b) consciousness of obtaining information, and (c) consciousness of problem-solving.
(2) the ability to prepare and implement a plan for a geographical practice activity, which includes (a) cooperative attitude, (b) design creativity, and (c) tool use.
(3) the ability to implement geographical practice activities, including the implementation of activities and experiential reflection (Ministry of Education of the People's Republic of China, 2018).

Currently, most international curriculum documents include competencies in through-developmental stages (e.g., ACARA, 2015; Department for Education England, 2013, 2014; Gallagher & Downs, 2012; Department of Basic Education, Republic of South Africa, 2011a, 2011b). However, researchers have yet to investigate GPPC at the primary school level or at the through-developmental stages of primary, lower-secondary, and upper-secondary school. Hence, the conceptualizations of GPPC described above provide a basis for this research.

Existing Framework of GPPC

Several researchers have refined the content framework of GPPC for upper-secondary school students based on the concept as discussed above (Luo & Yu, 2018; Xu & Lin, 2018; Yao & Liu, 2020). Findings regarding contexts are largely agreed upon in the literature; field trips, social surveys, and geography experiments are all considered to be contexts for GPPC (Luo & Yu, 2018; Xu & Lin, 2018; Yao & Liu, 2020).

While many scholars have explored the various components of GPPC, their findings are inconclusive, with some even overlapping. As shown in Table 1, they generally agree that GPPC includes key competencies and personal qualities. Key competencies include spatial orientation, access to information, scientific argumentation, and shared communication while key personal qualities include awareness and attitude. Because the competencies include aspects of cognition and behavior, GPPC may include the mental processes of cognition, awareness, attitude, and behavior.

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Table 1
Existing GPPC Frameworks

Researchers	Dimension	Sub-Dimensions
Yao & Liu (2020)	Cognition of geographical practice	Verbal information, intellectual skills, cognitive strategies
	Methods of geographical practice	Information acquisition, tool use, activity implementation
	Competencies of geographical practice	Abilities related to design cooperation, communication, and innovation
	Will and quality of geographical practice	Attitudes, personal qualities, and emotions, environmental ethics related to geographical practice
Xu & Lin (2018)	Spatial positioning	Consciousness of spatial positioning, cognition related to spatial positioning, attitudes toward spatial positioning, and behaviors related to spatial positioning
	Information acquisition	Consciousness of information acquisition, cognition related to information acquisition, attitudes toward information acquisition, and behaviors related to information acquisition
	Scientific argumentation	Consciousness of scientific argumentation, cognition related to scientific argumentation, attitudes toward scientific argumentation, and behaviors related to scientific argumentation
	Communication	Consciousness of communication, cognition related to communication, attitudes toward communication, and behaviors related to communication
Li & Ding (2019)	Practical knowledge of geography	Theoretical knowledge, practical knowledge
	Geographical practice attitude	Participation, scientific attitude, interest in learning, will quality
	Geographical practice evaluation	Practice process, practice results
	Geographical practice behavior	Design of geographical practice activities and their implementation
Sheng and Lu (2019)	Quality of thinking	Thinking, values, attitude, will
	Ability to act	Technology, ability
	Knowledge	Declarative knowledge, procedural knowledge
Luo & Yu (2018)	Skills	Expressive skills, reading skills, observation skills, communication skills, manipulative skills, mapping skills, geography production skills, skills in use of geographical technology
Huang & Chen (2018)	Qualities	Motivation (curiosity, questioning, inquiry, factuality), practical qualities (ethics, aesthetic sensibility, willpower), practical intelligence (situational practicality, creativity)
	Competences	Safety awareness; love, appreciation, gratitude, reverence, and other emotions; curiosity, passion, questioning, inquiry, factuality, and other scientific spirit
	Qualities	Safety awareness; love, appreciation, gratitude, reverence, and other emotions; curiosity, passion, questioning, inquiry, factuality

As mentioned earlier, the content of the geography curriculum at the primary school level in mainland China is incorporated in science and social studies curricula. Not surprisingly, GPPC receives little attention at that level. Furthermore, learners are more concerned about geography as an examination subject, and so GPPC receives relatively more attention at the upper-secondary school level and less at the lower-secondary school level. However, according to Piaget's cognitive theory of occurrence, the development of an ability or a volitional quality occurs from a lower to higher order (Piske, et al., 2017). Accordingly, since the acquisition of GPPC may also progress from elementary school to secondary school, it is important that this study also explores the competency component of GPPC from international curriculum documents.

Focus on GPPC in Selected National Geography-Curriculum Documents

The specific content of GPPC for primary and secondary school students is not easily evident from the curriculum documents of most countries. However, by starting with the key competences associated with GPPC and fieldwork common points, namely spatial positioning, information acquisition, scientific argumentation, and communication, common characteristics can be identified. The geography-curriculum documents for primary and

https://doi.org/10.33225/jbse/22.21.1083

secondary schools in mainland China, Hong Kong, Taiwan, Macao, Singapore, Australia, New Zealand, South Africa, England, Ireland, Germany, Finland, the United States, and Canada all basically overlap in terms of key competencies (e.g., ACARA 2015; Boehm & Kracht, 1974; Department for Education England, 2013, 2014; Department of Basic Education, Republic of South Africa, 2011a, 2011b, 2011c; France & Haigh, 2018; Gallagher & Downs, 2012; Education Bureau, Hongkong, 2011, 2015; Ireland, 1999; Finnish National Agency of Education, 2016; Kent, et al., 1997; Lock, 1998; Ministry of Education, New Zealand, 2015; Ministry of Education of the People's Republic of China, 2012, 2018; Rice & Bulman, 2001; Rydant, et al., 2010; Zhao, 2017).

Based on past research, a compilation of the components of GPPC for primary and secondary school students was proposed as a preliminary draft for this study:

(1) GPPC of primary and secondary school students can be defined as the ability to act and the qualities of will that students possess in geographical practice activities.
(2) The contexts in which GPPC of primary and secondary school students' practical geography competency can be applied are field trips, social investigations, and geography experiments.
(3) The four dimensions of GPPC for primary and secondary students are spatial positioning, information acquisition, scientific argumentation, and communication.

Each dimension of the component can be divided into four sub-dimensions, viz. consciousness of spatial positioning, cognition related to spatial positioning, attitudes toward spatial positioning, and behaviors related to spatial positioning.

Study Aim

To bridge some of the gaps in GPPC literature mentioned above, the present study was undertaken to design and validate a conceptual, contextual, and content framework for GPPC of primary and secondary school children in China.

Research Methodology

General Background

A mixed method research design was used to obtain expert opinions on the concepts, contexts, and content of GPPC for primary and secondary school students in China. This study was undertaken in three phases, with the results of one phase serving as a guide to the subsequent phase. In the first phase, qualitative data were collected through interviews. After the data were analyzed, a quantitative questionnaire was designed for the second phase during which the Delphi technique was applied to obtain reliable information through successive rounds of round-robin participation. The questionnaires were distributed to the experts via WeChat, QQ, or e-mail. From the quantitative data collected, a second quantitative questionnaire, viz. weighting questionnaire, was prepared in the third phase and distributed to the authors' peers by regular mail.

Participants

This study was conducted in mainland China. The research design was derived initially through exploratory focus-group interviews conducted at the research institution. At a meeting in December 2018, five experts in geography education were selected as focus-group members, including a participant in the development of geography curriculum standards, two writers of geography textbooks, a member of the primary science quality control team, and a professor of human geography.

According to these experts, it was feasible to classify the dimensions of GPPC as consciousness, cognition, attitudes, and behaviors, specific content needed to be determined through qualitative interviews, a Delphi expert questionnaire, and a weighting questionnaire involving as many experts in the area as possible. Similar to past practice in the relevant literature (Dalkey, 1969), a Delphi sample size of at least seven was recommended, with an ideal group size of ten to twenty. These experts saw the Delphi technique as a means of reaching consensus among experts in cases where there was a difference of opinion. It may be used until consensus is finally reached on a particular study. However, if consensus is reached in one round, it is possible to stop. Based on the results of interviews, a Delphi expert questionnaire was developed, Delphi expert members were selected, and a Delphi

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

expert survey was conducted. Among them, the Delphi expert members were selected to include expert scholars related to geographic practice or people with practical experience. The sampling was based on the following principles: (1) those with theoretical and practical experience; (2) researchers with communication and coordination skills; (3) workers who contributed to solving the research problems; (4) workers who actively participated in this study; and (5) high heterogeneity of the sample. A suggestion was made regarding the weighting questionnaire, i.e., it should be represented by an equitable selection of teachers (from the eastern, central, and western regions of China) who had participated in and organized applied geography activities. Accordingly, experts in geography education including university professors and primary and secondary school geography teachers were invited to reflect a representative sample. Also incorporated in the study were social studies and science teachers at the primary school level, given that the geography curriculum had been integrated into the science curricula at the primary school level. In order to ensure maximum variation within the sample, the experts in each part of the sample were from different regions and also, they did not work together.

Twenty experts participated in the qualitative interviews, eighteen were selected to complete the Delphi expert questionnaire based on the nature of the research topic and using the sampling principles described above, and one hundred five responded to the weighting questionnaire. The participants in the qualitative interviews were from educationally developed regions of China, viz. Shenzhen, Guangzhou, Beijing, and Shanghai. Twelve of them were secondary school geography teachers while eight were primary school science specialists who had participated in and organized geographical practice activities. The participants who completed the Delphi expert questionnaire were from Nanjing, Beijing, Wuhan, Tianjin and other educationally developed regions. Three were involved in the development of geography curriculum standards, four in the preparation of geography textbooks, nine were experts in geography education in secondary schools, and two monitored the academic quality of earth science in elementary schools. The participants who completed the weighting questionnaire were from Beijing, Kunming, Harbin, Shanghai, Guangzhou, and Nanchang. Five were PhD students in geography curriculum and pedagogy, twenty were expert teachers of elementary science, and one hundred were expert teachers of secondary geography.

Data Collection and Instruments

The data for the study were collected via qualitative interviews, the Delphi expert questionnaire, and the weighting questionnaire. Three researchers from mainland China were invited to review and provide feedback (i.e., communication validation) on the strategies used. One expert was a developmental and educational psychologist with a background in curriculum studies in the United States, the second was a geography-curriculum expert with a degree from Hong Kong, and the third, an expert in lifelong education and sustainable development. Their expert opinions were taken into account when formulating strategies for all the three phases of data collection, especially with regard to communication validation.

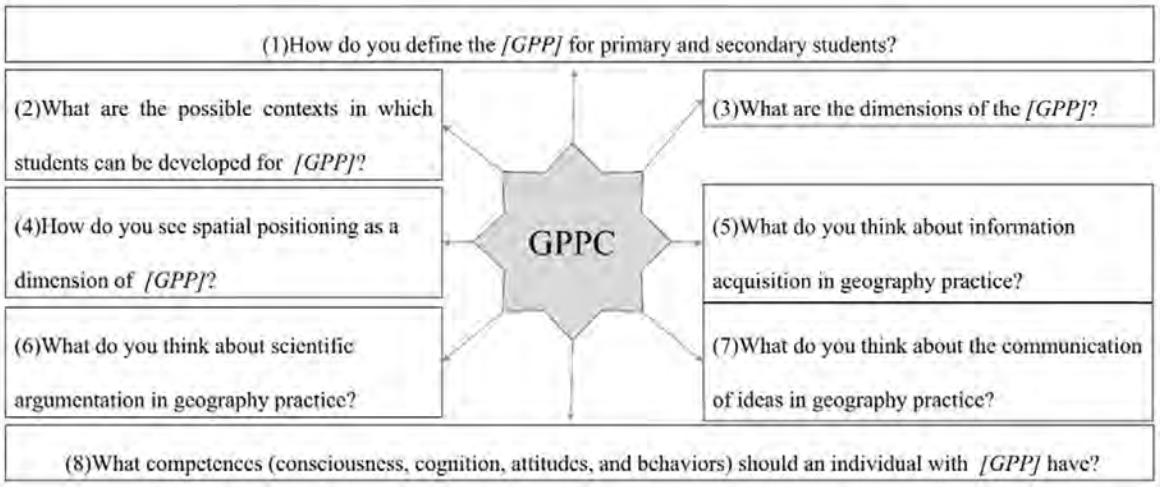
The interview outline was initially developed to identify the conceptualization, contexts, and the content related to GPPC. The draft outline had ten structured open-ended questions drawn from the literature. The interview outline eventually contained eight questions as presented in Figure 1.

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Figure 1

Interview Outline



Delphi expert questionnaire

The Delphi expert questionnaire was designed to decide on the content associated with GPPC. After much consultation, the questionnaire that was designed ultimately contained 95 items. A 5-point Likert scale was used, ranging from completely agree (1) to completely disagree (5). In addition, there was provision for comments on each item in the right-hand column of the questionnaire. An extract from the Delphi expert questionnaire is presented in Table 2.

Table 2

Sample Extract from the Delphi Expert Questionnaire

Indicator	Completely agree 1	Quite agree 2	**Somewhat** agree 3	Disagree 4	Completely disagree 5	Modify opinion **column**
A. Spatial Positioning						
A1. consciousness of spatial positioning						
A1-1. Recognizing the importance of using positioning tools or reference points for positioning						
A1-2 Concerns about the need to use positioning tools or references for positioning						
A1-3 Involvement in motivation to use positioning tools or references for positioning						

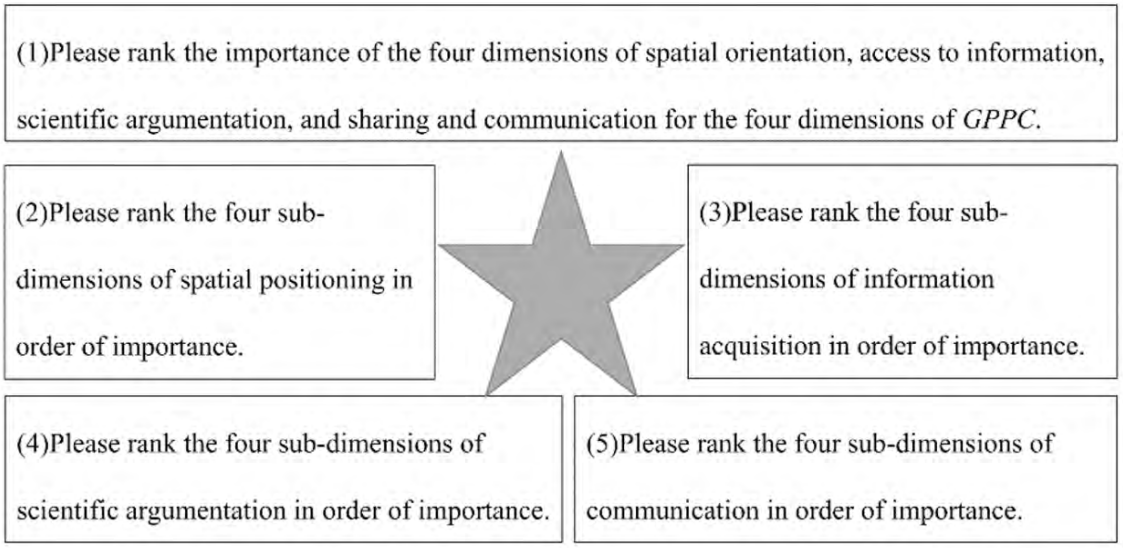
https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Weighting Questionnaire

A weighting questionnaire was developed to determine the weighting of each of the dimensions and sub-dimensions of GPPC. The questionnaire, after being reviewed, ultimately contained five questions, as presented in Figure 2.

Figure 2
Weighting Questionnaire



Data Analysis

The three main steps of data analysis for this study were coding, consensus building, and weighting of the dimensions and sub-dimensions of the content associated with GPPC.

Coding procedures were based on those of previous studies whereby a deductive qualitative content analysis was conducted: either word by word or sentence by sentence. In the first step of the study (during the first phase), 20 experts were interviewed, and their feedback was coded to initially establish the conceptualization and contexts for GPPC.

In the second step (during second phase), to determine whether a statistical consensus was reached, means and standard deviations were organized in tables. Consensus was reached if the mean was greater than 3.5 (out of 5) and the standard deviation was less than one.

The third step (during the third phase) was the weighting analysis, during which the results of the first-level dimension of GPPC (i.e., spatial positioning, information acquisition, scientific argumentation, and communication) and the sub-dimensions (i.e., consciousness, cognition, attitudes, and behaviors related to GPPC) were entered into equation (1), and the weight values for each indicator were calculated.

$$a_i = \frac{1}{n}\Sigma\left(\frac{a_{ij}}{\Sigma a_{ij}}\right); \text{I, j=1, 2, 3.....n.} \quad (1)$$

Research Results

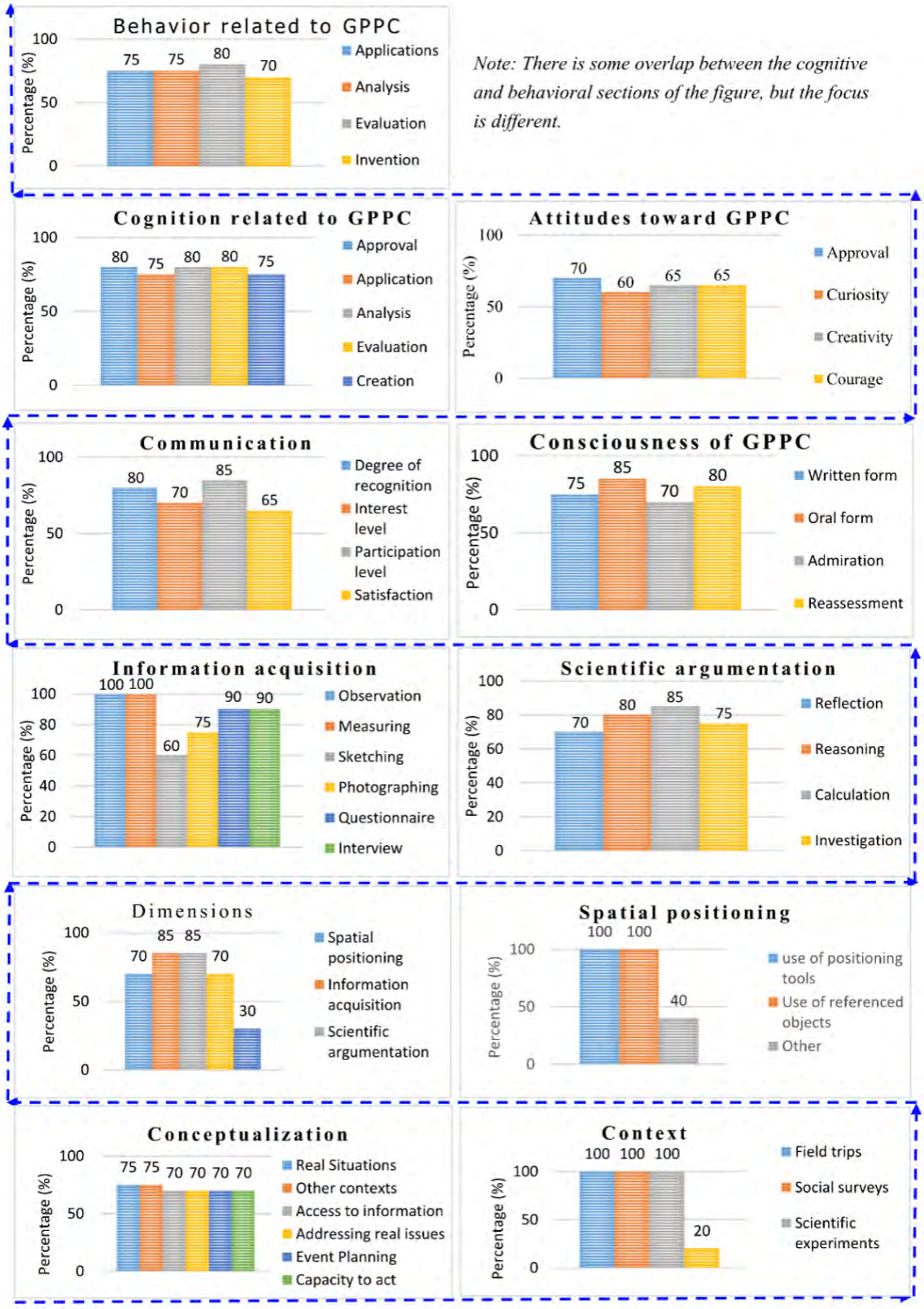
Qualitative Interviews

From the coded data, the views on the conceptualization, contexts, and content of GPPC for primary and secondary school students were summarized as shown in Figure 3.

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Figure 3
Summary of Interview Results

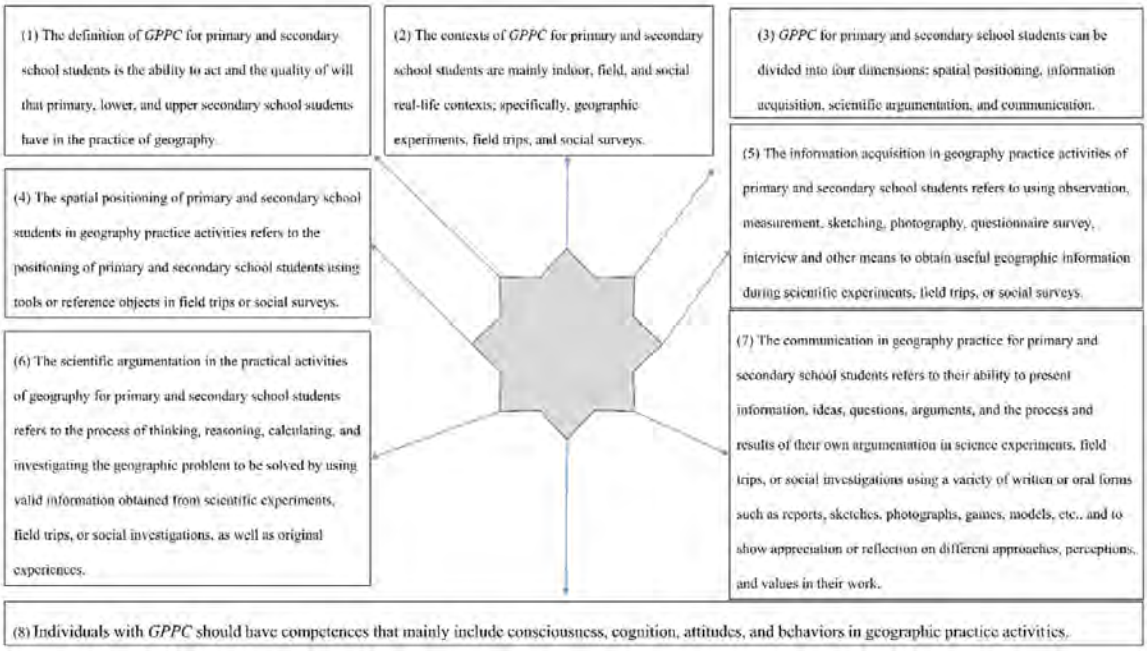


https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

There was a high degree of consistency in the preliminary views on conceptualization, contexts, and content associated with GPPC for primary and secondary school students. These are summarized in eight statements as presented in Figure 4.

Figure 4
Summary Statements on the Conceptualization, Contexts, and Content Associated with GPPC



Consciousness of GPPC refers to students' awareness of, attention to, participation in, and satisfaction with their individual experience of scientific experiments, field trips, or social investigations with regard to the dimensions of spatial positioning, information acquisition, scientific argumentation, and communication. Cognition related to GPPC refers to students' understanding, application, analysis, evaluation, and planning and design of scientific experiments, field trips, or social investigations, expressed through their understanding, application, analysis, evaluation, and planning and design of spatial positioning, information acquisition, scientific argumentation, and communication activities. Attitudes toward GPPC refer to students' intrinsic feelings, emotions, and intentions toward scientific experiments, field trips, or social investigations. These attitudes can be expressed in the form of approval of, curiosity about, willingness, and courage to implement spatial positioning, information acquisition, scientific argumentation, and communication. Behaviors related to GPPC refer to students' behaviors pertaining to application, analysis, evaluation, and creative behavior in relation to scientific experiments, field trips, or social investigations, demonstrated by their application of analytical, evaluative, and creative behaviors related to spatial positioning, information acquisition, scientific argumentation, and communication.

Delphi Expert Questionnaire

The results obtained from the qualitative interviews were used to design the Delphi expert questionnaire, with each set of questions representing a theme. Consensus was reached on each dimension of spatial positioning, information acquisition, scientific argumentation, and communication and their sub-dimensions (Figures 5 to 8).

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Figure 5
Consensus on Sub-Dimensions of Spatial Positioning

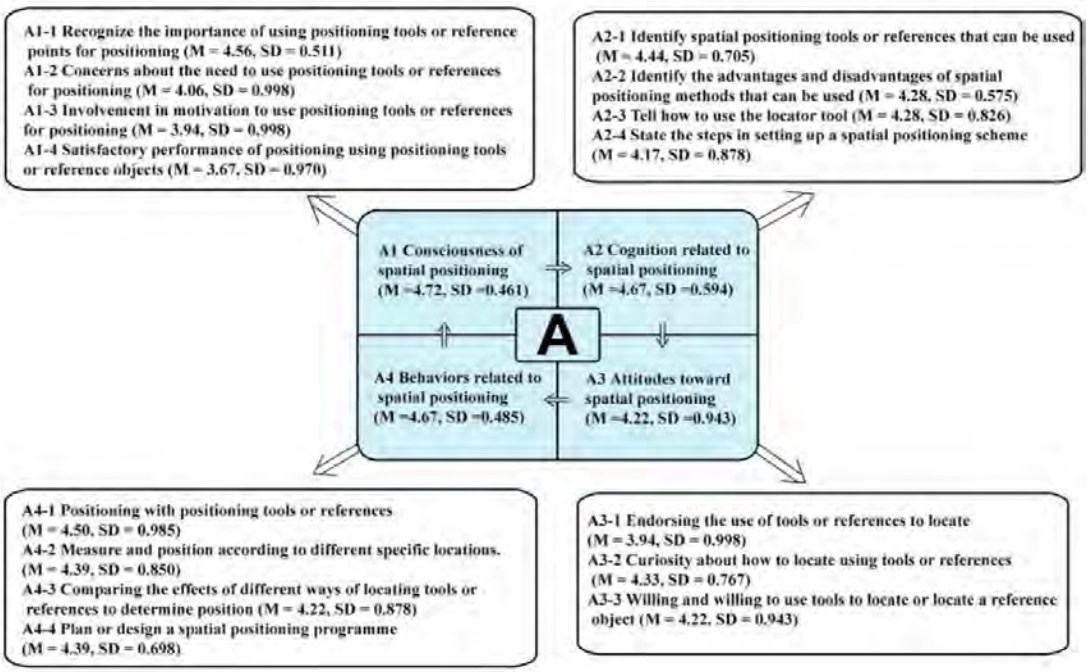
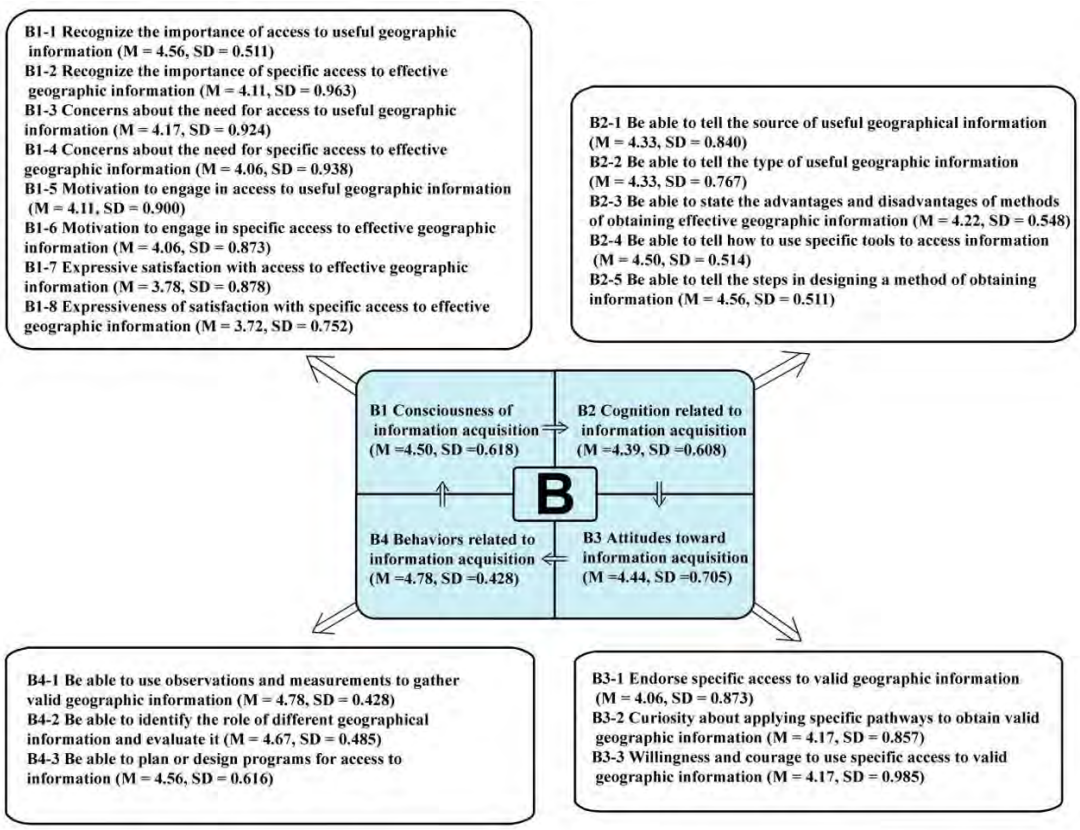


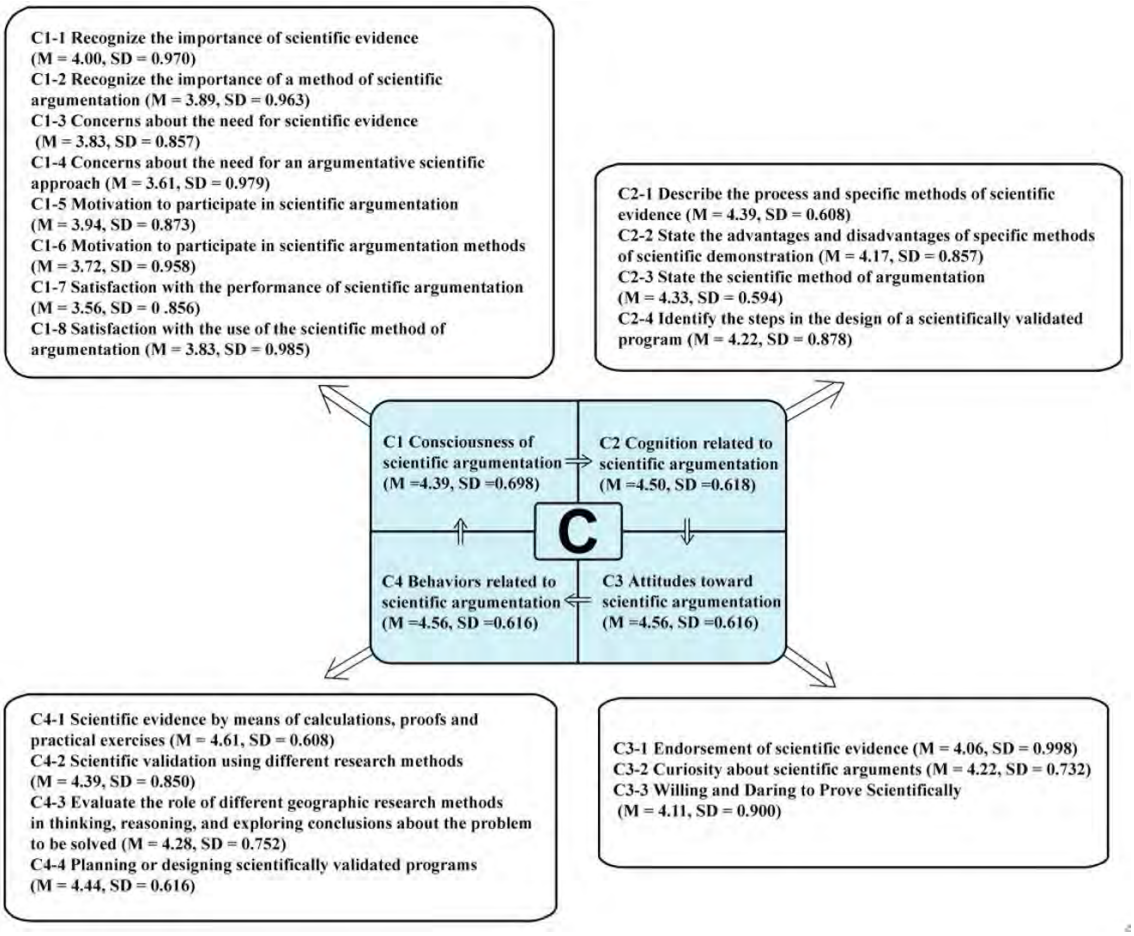
Figure 6
Consensus on Sub-Dimensions of Information Acquisition



https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

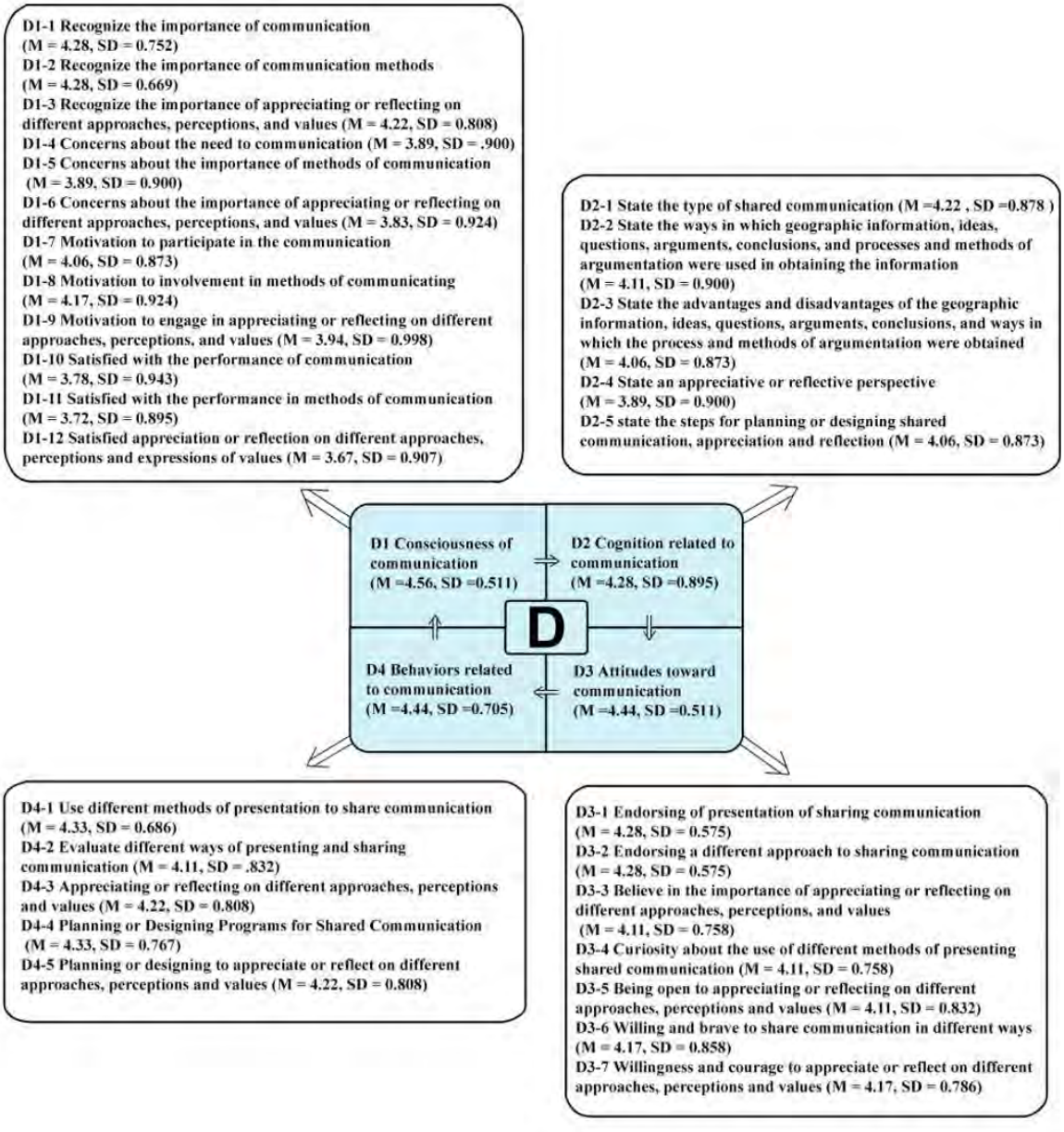
Figure 7
Consensus on Sub-Dimensions of Scientific Argumentation



https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Figure 8
Consensus on Sub-Dimensions of Communication



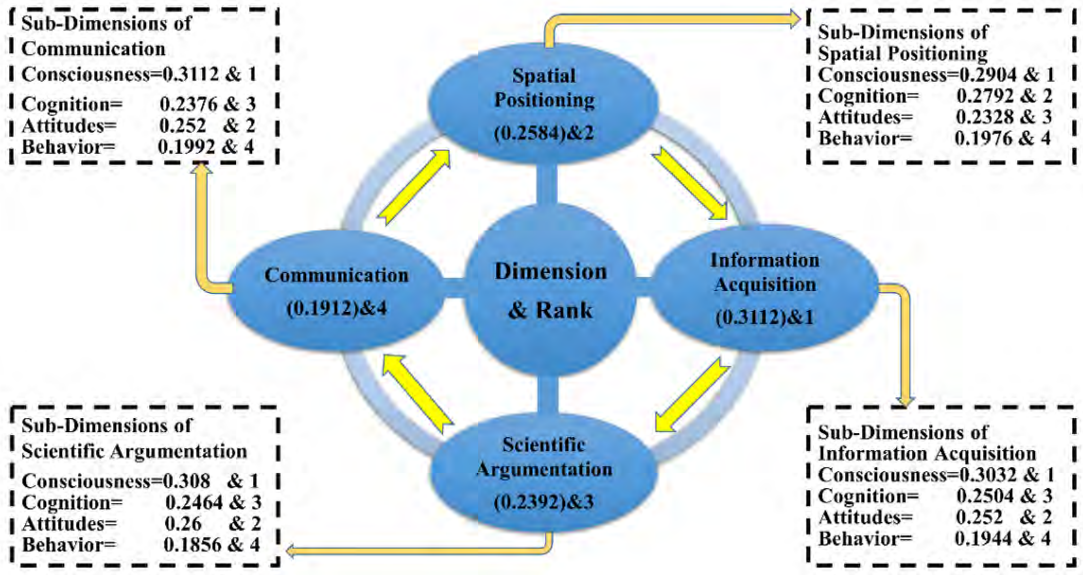
Weighting Questionnaire

The results obtained from the Delphi expert questionnaire helped in the design of the weighting questionnaire which required respondents to rank the relative importance of the four dimensions of GPPC and their sub-dimensions. The results of the weighting questionnaire are presented in Figure 9.

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Figure 9
Weighting of the Dimensions and Sub-Dimensions of GPPC



Weighting of the Four Dimensions of GPPC.

Figure 9 shows that information acquisition received the highest relative weighting and was considered to be the most important dimension of GPPC, followed by spatial positioning, scientific argumentation, and communication.

Weighting of each sub-dimension of GPPC.

The results of the relative weighting of the sub-dimensions of each dimension are shown in the figure. For all four dimensions, the sub-dimension of consciousness was rated the most important, with behavior the least important.

Discussion

To the authors' knowledge, this study is the first exploration of the components of GPPC for primary and secondary school students in China. It proposes the conceptualization, contexts, and content of GPPC derived from existing literature, expert interviews, a Delphi expert questionnaire, and a weighting questionnaire.

First, the conceptualization of GPPC is consistent with that of other studies, i.e., GPPC or a similar concept of fieldwork in geography essentially includes authentic situations. Information acquisition, problem-solving, activity planning, and action skills highlighted in this study are also present in some of the national geographic curriculum documents and in previous studies (e.g., ACARA, 2015; Department for Education England, 2013, 2014; Department of Basic Education, Republic of South Africa, 2011a, 2011b, 2011c; Finnish National Agency of Education, 2016; Gallagher & Downs, 2012; Ministry of Education of the People's Republic of China, 2012, 2018). This finding implies that, at any stage of schooling, GPPC comprise the abilities and personal qualities needed to identify problems, solve problems, and plan activities in real situations. It also incorporates the threefold nature of fieldwork, viz. (a) learning achieved by applying specific methods during an activity, (b) abilities and qualities of the experience gained by the method of the activity and (c) essence of core competencies—the "key competences and essential qualities" in authentic situations.

Second, the results related to the contexts for GPPC are also consistent with those of other studies. This sug-

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

gests that real-world contexts for the acquisition of GPPC by primary and secondary school students, as reflected in geographic experiments, field trips, and social surveys are common to most scholars (e.g., Huang & Chen, 2018; Li & Ding, 2019; Luo & Yu, 2018; Yao & Liu, 2020). This agreement is reflected not only in the literature but also in the interviews with the experts invited to participate in this study. A possible explanation for this is that traditional geography comes from the field and presents the subject matter from experimentation. Fusion of the two forms the current contexts for GPPC.

Third, the results for the content associated with GPPC are also broadly consistent with the findings of other studies. From a geographical perspective, Chinese primary and secondary school students' GPPC that includes spatial positioning, information acquisition, scientific argumentation, and communication is not only consistent with the geographic curriculum documents of many countries but also with current dimensions of GPPC (e.g., Huang & Chen, 2018; Li & Ding, 2019; Luo & Yu, 2018; Sheng & Lu, 2019; Xu & Lin, 2018; Yao & Liu, 2020). From a psychological perspective, the awareness, cognition, attitudes, and behaviors of primary and secondary school students are consistent with the conceptualization of core competencies, viz. key competencies, and essential qualities (Luo & Yu, 2018; Xu & Lin, 2018).

Fourth, findings with regard to the weighting of the dimensions and the sub-dimensions of GPPC may not quite align with the ideal outcome in terms of weighting. According to the conceptualization of GPPC and requirements in geography curriculum documents for activities that require the application of geographic knowledge, "scientific argumentation" might be expected to be the most important dimension of this process (Ministry of Education of the People's Republic of China, 2018; Sheng & Lu, 2019; Xu & Lin, 2018; Yao & Liu, 2020). However, the results of this study did not indicate the overarching importance of scientific argumentation. Information acquisition was rated the most important, followed by spatial positioning, and then only scientific argumentation and communication. This might be because information acquisition is considered the source and the most critical aspect of geographical practice activities.

It can be inferred from the nature of geography (Hartshorne, 1939) and the conceptualization of GPPC (Ministry of Education of the People's Republic of China, 2018) that behavior is likely to occupy the most important position in each sub-dimension. In this study, however, consciousness received the highest weighting in each sub-dimension, with behavior the lowest. This might be because it was felt that students were constrained by a number of practical considerations (e.g., safety issues, shortage of time, and evaluation mechanisms) that prevented them from conducting field trips and social research. Hence, there was more focus on awareness, concerns, engagement, and satisfaction.

Overall, the results of this study are consistent with previous research related to GPPC and the conceptualizations found in international geography curriculum documents. The results are less consistent than expected only for weighting. There are two possible explanations for this discrepancy: it may be related to the more restrictive conditions under which the application of geographic knowledge currently occurs in many countries or regions, or it may be related to the evaluation methods used, especially for the students who are preparing for post-secondary studies.

Implications

In terms of theoretical contributions, this study is unique in employing a mixed-method research design to explore GPPC for primary and secondary school students. By doing so, the reliability of the study was enhanced. In addition, the study can serve as a theoretical foundation for the development of strategies to enhance GPPC for primary and secondary school students.

In terms of practical contributions, the conceptualization, contexts, and content derived from this study can be directly applied to geography and related curricula for primary and secondary school students, thereby improving their GPPC as well as overall educational success. The framework developed in this study can also be used to assess the ability of primary and secondary school students to apply geographical knowledge. In addition, this study can provide a basis for the development of effective programs to improve students' GPPC.

Limitations and Future Work

There are some limitations to this study. First, a more rigorous demonstration of content validity is required. Second, the participants in this study were predominantly geography educators, a fact that somewhat diminished

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

generalizability of the results. Third, this study was conducted in mainland China, and further research would be needed to maximize its usefulness to geography educators worldwide. Nonetheless, future researchers can use the outcomes of this study as a basis for developing tools for GPPC assessment and for implementing an applied geography curriculum.

Conclusions

GPPC can be broadly defined as the quality and capacity that students possess or should have to engage in geographical investigations and experimental activities. It is essentially the ability to act and the qualities of will that students possess when they engage in geographic practical activities. The attributes of GPPC consist of geography experiments, field trips, and social investigations. As practical activities following scientific and operable principles in real geographical situations would enable students to unleash their full potential, it is important that GPPC is incorporated across the curriculum to nurture desirable personal qualities, both innate and acquired.

The content associated with GPPC was agreed upon by the Delphi team, but may need revision upon actual implementation. Moreover, the weighting of the dimensions and sub-dimensions of GPPC, while acceptable, must be applied with flexibility. Overall, the results of this study were consistent with conceptualizations in previous GPPC research. However, contrary to the expectation that scientific argumentation would be the most important dimension of GPPC, this study found that information acquisition was rated the most important, followed by spatial positioning, then only scientific argumentation, and communication. In each GPPC sub-dimension, consciousness received the highest weighting and behavior the lowest.

Acknowledgements

The authors would like to thank the experts who give useful suggestions for current research. The authors would also like to thank those who assisted with language revision.

Declaration of Interest

The authors declare no competing interest.

References

Australian Curriculum, Assessment and Reporting Authority [ACARA]. (2015). *The Australian curriculum*. https://www.australiancurriculum.edu.au

Boehm, R. G., & Kracht, J. B. (1974). Geographical expeditions: Field work for the elementary grades. *Journal of Geography, 73*(6), 7-12.

Bogdan, R., & Biklen, S. K. (1997). *Qualitative research for education: An introduction to theories and methods*. Allyn & Bacon.

CGE, I. (1992). International charter on geographical education. *International Geographical Union, Commission on Geographical Education*.

Chen, G. (1981). *Fieldwork and writing in human geography*. Taiwan Normal University.

Dalkey, N. C. (1969). The Delphi method: An experimental study of group opinion. *Studies in the quality of life. Delphi and decision-making*. The RAND Corporation RM-5888-PR.

Davis, B. G. (1993). *Tools for teaching*. Jossey-Bass Publishers.

Department for Education England. (2013). National curriculum in England: Geography programmes of study. https://www.gov.uk/government/publications/national-curriculum-in-england-geography-programmes-of-study/national-curriculum-in-england-geography-programmes-of-study

Department for Education England. (2014). *Geography GCE AS and A Level subject content*. Department for Education.

Department of Basic Education, Republic of South Africa. (2011a). *Curriculum and assessment policy statement - grades 4-6: Social sciences*. Department of Basic Education.

Department of Basic Education, Republic of South Africa, (2011b). *Curriculum and assessment policy statement - grades 7-9: Social sciences*. Department of Basic Education.

Department of Basic Education, Republic of South Africa. (2011c). *Curriculum and assessment policy statement grades:10-12 geography*. Department of Basic Education.

Finnish National Agency of Education. (2016). *National core curriculum for basic education 2014: National core curriculum for basic education intended for pupils subject to compulsory education*. Next Print Oy.

France, D., & Haigh, M. (2018). Fieldwork@40: Fieldwork in geography higher education. *Journal of Geography in Higher Education*, 1-17. https://doi.org/10.1080/03098265.2018.1515187

Gallagher, S. M., & Downs, R. M. (2012). *Geography for life: National geography standards.* National Council for Geographic Education.

https://doi.org/10.33225/jbse/22.21.1083

Gold, J. R., Jenkins, A., Lee, R., Monk, J. Riley, J., Shepherd, I., & Unwin, D. (1991). *Teaching geography in higher education: a manual of good practice*. B. Blackwell.

Good, C. V. (1973). *Dictionary of Education*. McGraw-Hill.

Hartshorne, R. (1939). The nature of geography: A critical survey of current thought in the light of the past. *Annals of the Association of American geographers, 29*(3), 173-412.

Huang, R., & Chen, J. (2018). High school students' geographical practice power training and evaluation plan. *Reference for Geography Teaching in Middle School,* (05), 34–37.

Irland. (1999). *Geography: Social, environmental and scientific education; curriculum*. The Stationery Office.

Kent, M., Gilbertson, D. D., & Hunt, C. O. (1997). Fieldwork in geography teaching: A critical review of the literature and approaches. *Journal of Geography in Higher Education, 21*(3), 313-332. https://doi.org/10.1080/03098269708725439

Li, J. (2017). On the cultivation way of geographical practice power (Serial 1). *Geography Education,* (04), 4–6.

Li, Y., & Ding, J. (2019). Research on the construction of evaluation system of geographical practice power of high school students. *Reference for Geography Teaching in Middle School,* (24), 56–58.

Lock, R. (1998). Fieldwork in the life sciences. *International Journal of Science Education, 20*(6), 633-642. https://doi.org/10.1080/0950069980200602

Luo, Q., & Yu, Q. (2018). Geographical practice power: Concept, connotation and evaluation. *Geography Education,* (06), 12–14.

Ministry of Education New Zealand. (2015). Skills and concepts / geography / social sciences / home – senior secondary. https://seniorsecondary.tki.org.nz/Social-sciences/Geography/Skills-and-concepts

Ministry of Education of the People's Republic of China. (2012). *Compulsory education geography curriculum standard*. Beijing Normal University Press.

Ministry of Education of the People's Republic of China. (2018). *General senior high school geography curriculum standards* (2017 edition). People's Education Press.

Muñiz Solari, O., Solem, M., & Boehm, R. (2017). *Learning progressions in geography education: International perspectives*. Springer International Publishing.

National Research Council (U.S.). (1997). *Rediscovering geography: New relevance for science and society*. National Academy Press.

Piske, F. H. R., Stoltz, T., Camargo, D. d., Vestena, C. L. B., Machado, J. M., de Freitas, S. P., Taucei, J. d. R. (2017). Creation process during learning of gifted students: contributions from Jean Piaget. *Creative Education, 08*(04), 505-513. https://doi.org/10.4236/ce.2017.84039

Rice, G. A., & Bulman, T. L. (2001). *Fieldwork in the geography curriculum: Filling the rhetoric-reality gap*. Indiana University of Pennsylvania.

Rydant, A. L., Shiplee, B. A., Smith, J. P., & Middlekauff, B. D. (2010). Applying sequential fieldwork skills across two international field courses. *Journal of Geography, 109*(6), 221-232. https://doi.org/10.1080/00221341.2010.502945

Schwandt, T. (1997). *Qualitative Inquiry: A Dictionary of Terms*. Sage Publications.

Sheng, Y., & Lu, Y. (2019). Construction of evaluation index system for senior high school geographical practice power. *Teaching and Management,* (004), 48–51.

Shi, T. (1989). *Middle school geography education: Theory and practice*. National Taiwan Normal University Secondary Education Counseling Committee.

The Education Bureau Hongkong. (2011). Geography curriculum guide (Secondary 1-3). https://www.edb.gov.hk/attachment/en/curriculum-development/kla/pshe/Geog_Curr_Guide_S1-3_Eng_web_final_21062011b.pdf

The Education Bureau Hongkong. (2015). Geography curriculum and assessment guide (Secondary 4 - 6). https://www.edb.gov.hk/attachment/en/curriculum-development/kla/pshe/9.Geog_C&A_Guide_e(2015.11.9)_clean_r2-wf.pdf

Wang, M., Huang, J., & Wei, D. (2017). A study on the criteria for the classification of the core competencies level of senior high school geography (Part IV·end): The criteria for the classification of the 'Geographical Practice Power' and a case study. *Reference for Geography Teaching in Middle School,* (17), 19–22.

Wei, Y. (2002). *Chapter ten: Design and implementation of outdoor teaching activities in rural geography*. Department of Geography National Taiwan Normal University.

Wu, Z., Yuan, S., & Niu, Z. (2019). The cultivation and application of geography practical power in the course of geography research travel. *Curriculum. Textbook. Teaching Method, 039*(03), 102–7.

Xie, H. (2020). Development of geography curriculum resources in schools from the perspective of geographical practice power ——Take the application of "Xinse" app in campus plant survey as an example. *Geography Education,* (02), 51–52.

Xu, Y., & Lin, P. (2018). Construction of the evaluation index system of geographical practice power of Chinese senior high school students in China. *Curriculum. Textbook. Teaching Method, 38*(010), 86–92.

Yao, M., & Liu, M. (2020). The study on the construction of the evaluation system of geographic practical ability of senior middle school students. *Geography Teaching,* (03), 33–38.

Zhai, X., Lu, X., Chen. G., & Gao, L. (2018). Dimensional deconstruction and model test of geographical practice power. *Reference for Geography Teaching in Middle School, 455*(23), 16–19.

Zhang, H., Xu, X., & Wang, X. (2019). A characteristic study on the cultivation of geographical practice power in the textbook "Geographical Activities" of the American AP course "Human Geography". *Reference for Geography Teaching in Middle School, 463*(07), 77–80.

Zhang, L., Wang, X., & Huang, R. 2020. Develop local geography resources and cultivate geographical practice: Taking "Soil" in the compulsory 1 of the new geography curriculum standard as an example. *Geography Teaching,* (10), 30–33.

Zhang, P., & Nina, S. (2019). Deconstruction and evaluation methodology of the geographical practical competence in German curriculum standards. *Geography Teaching,* (17), 52–59.

https://doi.org/10.33225/jbse/22.21.1083

ISSN 1648–3898 /Print/
ISSN 2538–7138 /Online/

Zhao, L., Yang, Q., & Yang, J. (2020). The construction of the course of geography practical ability based on real situation. *Geography Teaching,* (12), 61–64.
Zhao, Y. (2017). Doing fieldwork the Chinese way: A returning researcher's insider/outsider status in her home town. *Area, 49*(2), 185-191. https://doi.org/10.1111/area.12314

Received: *August 16, 2022* Revised: *September 30, 2022* Accepted: *October 05, 2022*

Cite as: Xu, Y., Liu, Z., & Lin, P. (2022). Components of geographical practice power competency (GPPC) for primary and secondary school students: Conceptualization, contexts, and content. *Journal of Baltic Science Education*, *21*(6), 1083-1100. https://doi.org/10.33225/jbse/22.21.1083

Yanhua Xu School of Geography and Environment, Jiangxi Normal University, China.
E-mail: yanhuaxuedu@foxmail.com
ORCID: https://orcid.org/0000-0001-8822-8891

Zile Liu College of Education, Capital Normal University, Beijing 100048, China.
E-mail: lzl920@foxmail.com
ORCID: https://orcid.org/0000-0001-5699-759X

Peiying Lin *(Corresponding author)* College of Teacher Education, Capital Normal University, Beijing 100048, China.
E-mail: peilincnuedu@foxmail.com
ORCID: https://orcid.org/0000-0002-4124-9836

https://doi.org/10.33225/jbse/22.21.1083