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Student perceptions of critical thinking in EMI programs at Japanese universities: A Q-methodology study

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ABSTRACT

Over the past two decades, Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) has pursued the internationalization of the nation's universities, enticing students from overseas through English-medium instruction (EMI) degree programs, that simultaneously aim to nurture Japanese students with global skills. The development of critical thinking (CT), is a stated aim of many such programs, yet CT has been a contested concept in Japanese education, while student understandings of CT differ in a diversified student body. Here, Q-methodology is utilized to investigate views of CT among Japanese and international students in EMI programs. 39 students who had completed CT courses at two national universities ranked statements describing the qualities of a critical thinker. Through factor analysis, four distinct views of CT emerged: two of which were highly favoured by Japanese students; two others by international students. Japanese students accentuated perspective taking, flexibility, listening to others, and reflexivity as essential qualities of a critical thinker, while international students valued logical argumentation, and evidence analysis. While this could be attributed to socio-cultural or pedagogical differences, it also provides impetus to explore the complex range of influences on students' identity construction within EMI programs.

1. Internationalization, EMI, and critical thinking in Japan

In 2019, 312,214 students from abroad were enrolled at Japan's higher educational institutions and Japanese language schools (JASSO, 2021). The objective of 300,000 international students studying in Japan by 2020, sought by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) since 2004 through numerous funding initiatives, had been met a year early. However, this number would fall to 279,597 in 2020 (JASSO) with the impact of Covid-19. While there have been a multitude of negative consequences to the global pandemic affecting higher education worldwide that could not have been foreseen, this situation highlights the precariousness that comes with placing focus on quantitative internationalization goals and measures (Hofmeyr, 2021), and with the broader 'competitive, elitist and market-oriented direction' of internationalization (de Wit & Altbach, 2021, p. 35), which can sometimes sideline inter-cultural, collaborative and scholarly aspirations.

The MEXT has looked to attract students from other countries in unprecedented numbers, while simultaneously fostering an 'intercultural and international dimension in the teaching-learning process' through 'internationalization at home' (Knight, 2008, p. 22). Both of these aims are facilitated through the use of English as the medium of instruction (EMI) in university courses and degree programs, to the extent that internationalization efforts have become synonymous with Englishification (Galloway et al., 2020), and led to 'the emergence of flexible, unique forms of English language education' (Rose & McKinley, 2018, p. 111). Academic content courses

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are now offered in English at over 40% of Japan's 779 universities, while 40 institutions offer undergraduate and graduate degree programs taught entirely in English (MEXT, 2017).

The concept of critical thinking (CT) is strongly connected with discourse surrounding this internationalization drive, and the missions of EMI degree programs at Japanese universities. The MEXT includes 'understanding multiple and diverse cultures, logical thinking, problem-solving skills, autonomy, self-management, and a sense of ethics' - all traits which draw upon critical thinking - among thirteen competencies that universities should target as the outcomes of undergraduate degree programs, or 'graduate attributes' (*gakushiryoku*) (Central Council of Education, 2015). Around EMI degree programs in particular, CT has become a buzzword in mission statements and course descriptions; used to distinguish the aims and benefits of learning subject content through English (rather than simply learning English). One program describes ideal graduates as 'future citizens', who 'combine specialized knowledge with flexible problem-solving skills, and pair a pioneering spirit with strong critical thinking abilities in order to take on positions of leadership in public life.' (The University of Tokyo, 2020).

Declarations such as this are illustrative of the way in which 'the evolution of the university into a business turns 'being critical' into one of its most cherished products' (Turner, 2011, p. 199). CT is a symbolic term that is used with some ambiguity, and can be added to the list of qualitative concepts commonly figuring in Japanese education reform discourse with poorly articulated or intentionally elastic meanings that includes 'active learning' (Ito, 2017), 'global human resources' (*global jinsei*) (Bosio, 2021; Hofmeyr, 2021), and internationalization (*kokusaika*) itself (Burgess et al., 2010; Goodman, 2007; Hashimoto, 2000). Furthermore, there is a disconnect between policy discourse and the bottom-up intercultural dynamics found in classrooms. When instructors and students from different educational and cultural backgrounds are brought together, they bring their own ideas about what it means to be a critical thinker that may clash, complement or combine. This study set out to explore these subjective understandings using Q-methodology with two groups of students that are representative of the diversity within EMI courses and programs at Japanese universities.

2. Critical thinking, Japanese universities, Japanese students

This section covers three areas of literature pertinent to this investigation: (1) The development of definitions of critical thinking and the conceptualization of CT as a process in Scriven and Paul's (1996) definition. This holistic conception was utilized as a framework for the selection of statements in the survey instrument, and is referred to in the discussion. (2) Literature that has problematized CT in Japanese university education from cultural, political, and sociological perspectives. (3) Research that has investigated the critical thinking skills of Japanese students.

2.1. The critical thinking process

While philosophers since Socrates have described the potential for a critical faculty, it is in the twentieth century that critical thinking was distinguished as an educational concept, and in the United States that a critical thinking movement grew around neoliberal education reforms in the 1980s (United States National Commission on Excellence in Education, 1983; Dinkelman, 1990). Earlier definitions which focused on logic (Dewey, 1933, p. 9; Glaser, 1941, pp. 5–6) were updated, with new definitions proposed by numerous practitioners (Ennis, 1987, pp. 1–5; Facione, 1990; Lipman, 1988; McPeck, 1981). Synthesizing and building upon this 'second wave' of understandings (Santos, 2020, p. 2; Walters, 1994), Scriven and Paul (1996) proposed the following, holistic wording through 'The Foundation for Critical Thinking' in California:

The intellectually disciplined process of actively and skilfully conceptualizing, applying, analyzing, synthesizing and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning or communication as a guide to belief and action (Scriven & Paul, 1996).

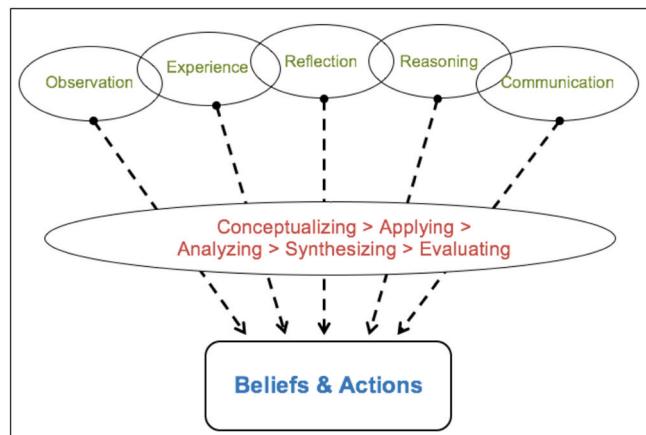


Fig. 1. A visualization of the filtering mechanism in Scriven and Paul's (1996) definition of critical thinking.

By viewing CT as a ‘guide to belief and action’, this definition frames it as a life skill rather than a reserve of academia, or the application of formal logic. In fact, reasoning, rather than being central, becomes an object of CT. It has been placed alongside observation, and communication as stimuli for five elements of a process: conceptualizing, applying, analyzing, synthesizing and evaluating. It is this process that is at the core of CT: which acts as a filter for information to guide actions and beliefs, and the use of this filter is something that can be trained and improved, in order to be used in an ‘intellectually disciplined’ way. [Fig. 1](#) visualizes this filtering process.

2.2. Critical thinking in Japanese universities

Interest in CT around higher education in Japan has been growing since the 1990s, shadowing its emergence in the US. However, it is also a contested concept that has been viewed as a challenge for cultural, political, sociological and linguistic reasons. CT proposes a model of rationality that has been critiqued in itself as: ‘culturally biased in favor of a particular masculine and/or Western mode of thinking, one that implicitly devalues other ‘ways of knowing’ ([Burbules & Berk, 1999](#), p. 49), and its appropriacy as an expected educational outcome in an Asian high-context culture, where harmony and deferment to authority are emphasized, has been questioned ([Atkinson, 1997](#); [Davidson, 1998](#); [Day, 2003](#); [Fox, 1994](#)). While these scholars contend that teaching CT in East Asian locales constitutes a form of cultural imperialism, this view has itself been critiqued for being ‘culturally chauvinistic’ ([Paton, 2005](#), p. 9) or based on orientalist tropes such as groupism ([Kubota, 1999](#)). Furthermore, the significance of these discussions has been negated to a certain extent, by the clear mandate for critical thinking education coming from the Japanese government and business community in response to globalisation ([Long, 2003](#), p. 218): As its incorporation into curricula has been demanded and it is being infused into teaching practices, the question of whether it can or should be taught becomes somewhat moot.

Official sanctioning, however, brings with it other conundrums. [Rear \(2008\)](#) suggests that CT poses a socio-political dilemma for Japan’s conservative government and business elites, for while they may hope to develop competitive business leaders with the necessary skillset to make informed, independent judgments on the global stage, certain attitudes encouraged by CT such as individuality, and the rejection of assumptions behind conventional thinking, are traits they may not wish to spread widely. Perhaps this can explain why in MEXT competency discourses such as *ikiru chikara* or *gakushiryoku* ([Central Council, 2008; 2015](#)) CT is alluded to through generic skills such as logical thinking, autonomy or problem-solving, rather than directly referred to. Yoneyama concurs that critical thinking poses a dilemma to ‘hierarchical, competitive and conformist institutional structures’ ([Yoneyama, 2012](#), p. 235), but locates these power structures within educational systems, and therefore sees the challenge as primarily sociological; of creating a classroom and school environment in which a ‘synthesis of the best of the Western academy and the positive aspects of Eastern social relations’ (p. 244) can occur. Such opportunities could arguably be seen to be opening up with the greater prominence of EMI in Japanese universities.

2.3. Japanese students’ critical faculties

Empirical studies involving student participants generally paint a more positive picture of Asian students’ critical thinking skills and tend to highlight language proficiency as a determiner of performance, while downplaying cultural factors or linguistic characteristics of their L1. Stapleton challenges the stereotypes of Asian students in two studies with Japanese students in English writing classes that looked at writing samples ([2001](#)) and surveyed attitudes ([2002](#)), finding a good understanding of elements of CT such as the need to support claims with evidence ([Stapleton, 2001](#), p. 526). In their study at a university in New Zealand using commercially available critical thinking assessments, [Lun, Fisher and Ward \(2010\)](#) found that English proficiency rather than differences in thinking style explained the lower performance of Asian students in comparison with their New Zealand European counterparts, while a tendency to rely on dialectical thinking (thinking from multiple perspectives) to solve critical thinking problems was observed in Asian students. [Manalo and Sheppard \(2016\)](#) also found language proficiency affected the performance of Japanese students evaluative writing in English, while they found nothing inherent in the structures of the Japanese language that inhibited production of evaluative statements, when giving students the same tasks in Japanese. McKinley also considers differences in rhetorical style between Japanese and English to be of less importance ([2013](#)) and in a study involving writing samples, interviews and observation of 16 students, pinpoints the difficulties students face in constructing their academic identities as writers in English through the ‘heavily guided process’ of learning academic genre and style conventions ([McKinley, 2017](#), p. 228).

3. Research design

The studies mentioned in the last section used various means to measure the critical thinking skills of Japanese or Asian students, and suggest the equivalence of CT across cultural boundaries, while highlighting the linguistic challenge of performing CT in English. While this understanding can inform approaches to CT in EMI courses and programs, not a lot is revealed about how students from different backgrounds actually conceptualize the meaning of CT. In one study that did approach this question directly, a dearth of other research in this area was noted ([Manalo et al., 2015](#), p. 300), while more research into how EMI policies are operationalized in the classroom has also been called for ([Aizawa & Rose, 2019](#), p. 1128; [Rose & McKinley, 2018](#), p. 127). EMI courses and programs offer a unique environment within which to investigate the conceptualization of CT, because of the diverse intersection of nationalities, languages and educational backgrounds that shape the perspectives of students. Two questions that guided the present inquiry target these subjective views:

- I- How do students from different backgrounds in EMI degree programs and courses perceive the attributes of a critical thinker?
 II- What factors influence EMI students' understanding of the meaning of critical thinking?

Q-methodology, which aims for the 'systematic study of subjectivity' (Stephenson, 1935) is employed to answer the first question, while the second question is explored in a discussion of the results. Described as 'a composite of philosophy, concepts, data-gathering procedures, and statistical methods' (Brown qtd. in Given, 2008, p. 699), Q-methodology has sometimes been understood as a quantitative or mixed method, though its statistical techniques are essentially designed to grapple with qualitative problems:

Q-methodology research emphasizes the qualitative *how* and *why* people think the way they do; the methodology does not count *how many* people think a certain way. The goal of Q-methodology is, first and foremost, to uncover different patterns of thought (not their numerical distribution among the larger population). (Valenta & Wigger, 1997).

Q utilizes a statistical factor analysis of participant responses to qualitative statements in a survey instrument (known as the Q-sort). This survey was given to ($n = 39$) student participants who had completed CT courses at two national universities in Japan.¹ Students were required to rank in terms of importance 32 statements describing CT, taken from transcripts of interviews with CT course instructors and university degree program mission statements, that had been used as data sets in two previous studies (Gyenes, 2019, 2020). Combined, these two data sources provided a large 'concourse' of statements -conceived in the communication theories of Q-methodology as a representation of the 'universe of ideas'- (Stephenson, 2014, p. 44) about CT, derived from the utterances of other key stakeholders in Japanese higher education: program administrators and course instructors. The Q-sort constructed from this concourse allowed for comparison of how the two groups -one made of Japanese students largely educated in the mainstream Japanese system and the other Japanese and international students educated largely outside the mainstream Japanese school system-understood CT.

3.1. Participant groups

The Q-sort was given to two groups of undergraduate students at two national universities in Japan, providing a total of 39 completed surveys. Both groups had just completed one semester courses in critical thinking. These courses were taught in English, each by a different instructor; one of whom was the researcher (University A), the other a professor of psychology (University B). In both cases, the surveys were given during the final class of a 15-week critical thinking course. As the surveys could be administered in a face-to-face setting, to students within their classroom environment, it was deemed most practical to prepare the Q sort on cards, with the Q-grid on a poster that each participant could stick their cards onto. An example of one of these completed posters is shown in Fig. 2.

Group one (University A) consisted of 22 students who were all Japanese or raised and educated in Japan. There were two students of Chinese descent in the group, but both were born in Japan and identified Japanese as their first language. All students were first year economics majors taking the course as a requirement. While their economics courses were taught in Japanese, these students were part of a select admission stream, taking part in the department's 'global talent' (*global jinsei*) program. As part of this program, they would go on to spend their second year studying at partner universities overseas and write their graduation theses in English in their final year. The critical thinking course that they took was part of a series of EMI courses, taken in preparation for study abroad. All students in this group had a high-intermediate to advanced level of English competency, and several had previously studied abroad for periods of up to two years.

Group two (University B) consisted of 17 students and was mostly made up of international students, hailing from countries including Australia, Sweden, Vietnam, The Philippines, Korea, China and Japan. However, many of these students had been educated at international schools or outside of the country of their birth: of the five Japanese students in this group, two identified languages other than Japanese as their first language. All students in this group had a native or near-native level of English-a prerequisite of their degree program. Most students in this class were in their first year of the university's four-year EMI social science undergraduate degree program, took all their classes in English, and were also taking the critical thinking course as a compulsory class. However, the class also included two graduate students from other departments, taking the course as an elective.

3.2. Context of the study

Between these two groups, the internationalization of Japanese universities that seeks to attract bright students from other countries to Japan as a catalyst for globalization, as well as provide 'internationalization at home' for elite Japanese students is well represented. In fact, both programs, and the critical thinking courses that are compulsory classes within them, can be said to exist as a consequence of the funding received through two MEXT internationalization drives that separately targeted attracting international talent ('Top Global University Project') and training Japanese students with global competencies ('Go Global Japan Project') (see Rose & McKinley, 2018, pp. 119–120).

With the development of EMI programs, the division between language courses taught by language teachers, which are conceived to fulfil a perceived need for EAP (English for Academic Purposes) or CLIL (Content and Language Integrated Learning) within the

¹ The sample size and number of statements are in line with those used in other Q-methodology studies (Watts & Stenner, 2012, pp. 70–75).

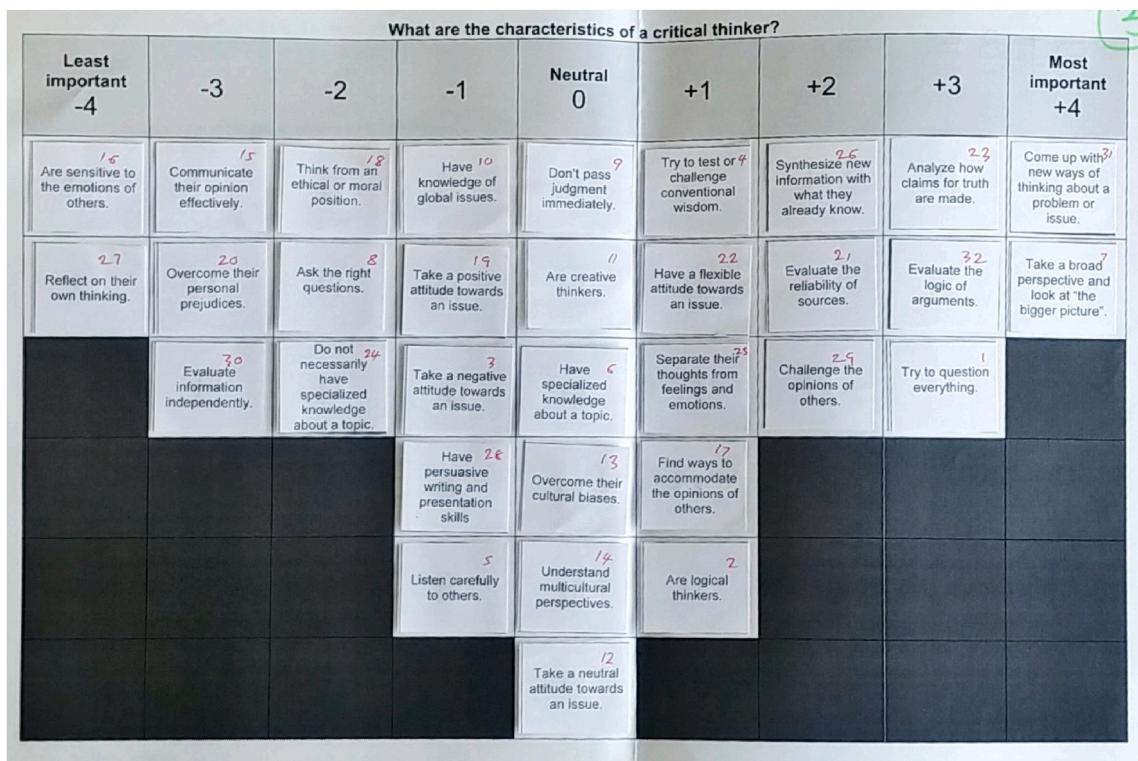


Fig. 2. Example of a completed Q-sort.

curriculum, and academic content courses that are also taught in English, traditionally delivered through lectures and tutorials by academics, has become less clear (Bradford & Brown, 2018). Both groups of students are using English as a means to study critical thinking among other content courses. In University A, the critical thinking course was independent of the English curriculum within the program, while students at University B took no English language courses as part of their degree.

Although one of the course instructors was a professor with a background in psychology, and the other a trained language instructor, our approaches to teaching critical thinking bore similarities: neither course used a critical thinking textbook, instead relying on instructor created materials such as case studies developed from news media and other sources to involve students in task-based scenarios. However, approaches to classroom management, interaction style and assessment were different, in accordance with our teaching backgrounds. While development of English skills is a major motivation for students in group one (who are preparing for overseas study), it is not a major motivating factor or need for group two. Nevertheless, in both cases the stated course aims were to develop academic and media literacy rather than linguistic competence.

4. Findings

Taking an inductive approach to the research question, the q-sorts from both groups were analyzed together as one larger group of 39. One purpose for selecting Q-methodology, which analyzes the variability in the tests against the group of individuals, was not to treat the two groups separately, but to allow the factors analysis to group and divide the participants according to the degree of correlation in their responses, and then examine the composition of each resulting factor (group). In the resulting analysis, four distinct factors were extracted from the data.

4.1. Analysis procedure

Survey analysis was performed using the specialized Q-method web-based application, Ken Q Analysis (<https://shawnbanasick.com/>).

Table 1
Eigenvalues and explained variance in six factors.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Eigenvalues	13.1456	3.3537	2.5894	2.4107	2.021	1.8862
% of explained variance	34%	9%	7%	6%	5%	5%
Cumulative % of explained variance	34	43	50	56	61	66

[github.io/ken-q-analysis/](https://github.com/ken-q-analysis/); accessed July 20th 2018). Six factors were initially extracted from a principal component analysis of the correlation matrix of 39 surveys. The first factor accounted for 34% of explained variance, with each subsequent factor accounting for a decreasing proportion. As the first four factors accounted for a significant portion of variance at 56% (see Table 1), and factors five and six each accounted for just five percent, it was decided to use the first four factors in the analysis. This decision was made using a scree plot (Fig. 3), where a notable ‘bottoming out’ can be seen after factor four, indicating a suitable cutoff point (Watts & Stenner, 2012, p. 106). Furthermore, at just five percent of explained variance, factor five and six each account for less than the variance of two students, and therefore cannot be considered as representative sub-groups. Varimax rotation was therefore applied to factors one to four in this analysis.

4.2. Four distinct views of critical thinking

The factor loading of each individual Q-sort (the extent to which each student’s survey correlates with each factor) can be seen in appendix B. Here, individual Q-sorts are coded with “A” and “B” to indicate which university the students were from, as well as abbreviations for gender and nationality.

The understanding of critical thinking that emerges from each group is clearly distinct, and, as can be seen in appendix B, there is also a very clear divide between two groups that are mostly made up of Japanese students from University A (factor 1 and 4) and two groups mostly made up of non-Japanese students from University B (factor 2 and 3). Furthermore, Table 2 shows strong correlation between factor 1 and 4, and factor 2 and 3. Based on the factor loadings in appendix B, composite Q-sorts (Figs. 4–7) and tables showing distinguishing statements (Tables 3–6) are used to present each factor in the following sections.

4.3. Factor 1: flexible, multicultural thinkers

Factor one students could be called ‘flexible, multicultural thinkers’. They have highlighted flexibility, perspective-taking, listening to others, and reflecting on their own thinking above other elements of critical thinking. Additionally, they rated ‘understanding multicultural perspectives’ highly, and other statements with an inter-cultural aspect such as ‘overcome their own cultural biases’ and ‘have knowledge of global issues’ were also rated higher than by other groups.

In addition, students in factor one placed least importance in logical reasoning. ‘Evaluate the logic of arguments’ and ‘analyze how claims for truth are made’ are lower than other groups, as well as other statements related to reasoning such as ‘evaluate the reliability of sources’, ‘think from an ethical or moral position’, and ‘make logical arguments’. They were also less concerned with performative aspects of critical thinking such as ‘having persuasive writing and presentation skills’, or ‘challenging the opinions of others’. Therefore, factor one can be said to consider flexibility, perspective taking and reflexivity most important, and also strongly associate CT with an intercultural dimension.

4.4. Factor two: independent evaluators

Factor two students could be termed ‘independent evaluators of evidence’. They rate ‘evaluating the reliability of sources’ and ‘evaluating information independently’ highest, and other statements placed highly are mainly concerned with judging arguments and evidence, such as ‘evaluate the logic of arguments’, and ‘analyze how claims for truth are made’. They identify a critical thinker as an independent, individualist thinker, also rating ‘overcome personal prejudices’ and ‘synthesize new information with what you already know’ higher than any of the other groups. Performative aspects of critical thinking such as ‘having persuasive writing and

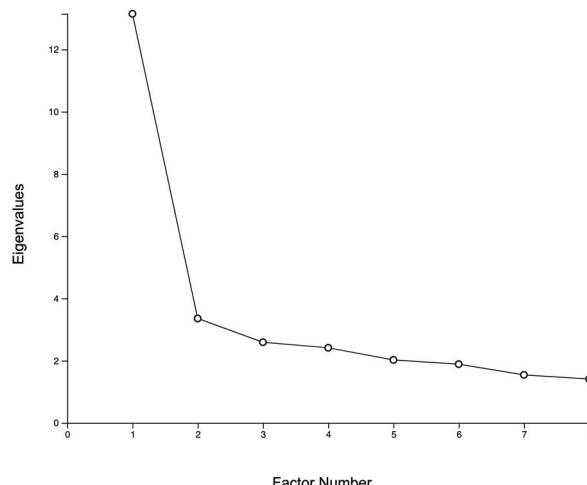


Fig. 3. Scree plot showing the eigenvalues for factor extraction.

Table 2

Correlation between the four factors.

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1	0.4129	0.519	0.5881
Factor 2	0.4129	1	0.5503	0.4132
Factor 3	0.519	0.5503	1	0.5022
Factor 4	0.5881	0.4132	0.5022	1

presentation skills' and 'challenging the opinions of others' are rated slightly higher than other groups as well, while factor two also considered flexibility and perspective taking to be of less importance than other groups. These points place factor two in stark contrast to factor one, and indeed these two groups had the least correlation between their factor arrays.

Factor two also did not value creativity or questioning as elements of critical thinking, giving low ratings to statements one, eight and eleven. Their understanding of critical thinking can therefore be said to be more narrowly focused on evidence evaluation and independent judgement.

4.5. Factor three: *inquisitive and innovative*

Like factor two with whom they show correlation, factor three students placed 'evaluating the reliability of sources' and 'evaluating the logic of arguments' highest. They define critical thinking in terms of logical reasoning and evidence evaluation, also ranking 'analyze how claims for truth are made' higher than any other groups. However, this group also placed importance on 'asking the right questions', a statement that all other groups had given a negative rating. They also displayed a tendency towards innovation not shown by other groups, by placing importance in 'coming up with new ways of thinking about a problem or issue' and 'testing or challenging conventional wisdom', and also rated 'are creative thinkers' marginally higher than other groups. They also placed less importance in overcoming cultural biases and personal prejudices compared to other groups, and do not think that critical thinkers need to give much consideration to the opinions and feelings of others, with both 'find ways to accommodate the opinions of others' and 'are sensitive to the emotions of others' given low ratings.

Therefore, while similar to the factor two group in terms of considering the evaluation of logic and evidence most important, factor three students differ in terms of their inclination towards asking questions, creative problem-solving and generating new ideas, where factor two was inclined towards being persuasive and challenging others. Factor three can therefore be called 'inquisitive innovators'.

4.6. Factor four: *balanced, flexible evaluators*

The fourth factor's view of critical thinking can be considered as a kind of hybrid between placing importance in flexibility and perspective taking (like factor one), and valuing reasoned argumentation (like factor two and three). They have ranked 'separating thoughts from feelings and actions' and 'making logical arguments' highest, and also consider 'taking a neutral attitude towards a problem or issue' a high priority, unlike other groups. Therefore, they can be viewed as placing importance in taking a balanced view, putting emphasis on logical argumentation. However, they have also rated 'taking a broad perspective', 'having a flexible attitude towards a problem' and 'understanding multicultural perspectives' highly. The correlation between factors one and four is the highest, and they clearly share an emphasis on broad-mindedness and intercultural understanding with students of group one. Yet whereas factor one had rejected logical reasoning, this group values it.

At the same time, they downplay the importance of certain other attributes that were rated highly by either factor one or two: 'listening carefully to others', 'evaluating information independently', and 'reflecting on their own thinking', were all considered of less importance by this group. Ultimately, their understanding of critical thinking seems to be focused on two elements: being broad-minded and flexible on the one hand and being neutral and balanced on the other.

4.7. Factor breakdown

Table 7 summarizes a breakdown of university programs, nationalities and genders for each of the four factors. What is striking is that factor one and four (which showed strong correlation) are predominantly made up of students from University A (21 out of 25 students), a mostly homogenous Japanese group. By contrast, factor two and three are almost exclusively from the international group of students at University B. (with just one student from University A.). There is therefore a clear divide between the students from the two university programs.

Nationality is less useful than university program to describe the differences between factors. As noted previously, both groups include Japanese students, but those from University B were educated overseas or in international schools. Both groups include Chinese students, but the two from University A. were both born in Japan, and considered Japanese their first language, while the Chinese student at University B. was born in China, and was in Japan as an exchange student. Simply dividing the groups according to nationality does not describe the identities within the two programs as effectively as their educational backgrounds.

Notwithstanding this, factor one and four are predominantly made up of Japanese students. Factor three is mostly non-Japanese. Of four students in factor two, two are Japanese (though both came from the 'international' program). A distinction based on nationality is more difficult to make, though 20 of a total of 24 Japanese students are in factor one and four.

-4	-3	-2	-1	0	1	2	3	4
Evaluate information independently.	Take a positive attitude towards an issue.	Ask the right questions.	Do not necessarily have specialized knowledge about a topic.	Come up with new ways of thinking about a problem or issue.	Separate their thoughts from feelings and emotions.	Reflect on their own thinking.	Take a broad perspective and look at "the bigger picture".	Have a flexible attitude towards an issue.
Take a cynical attitude towards a problem or issue.	Challenge the opinions of others.	Have persuasive writing and presentation skills	Analyze how claims for truth are made.	Are creative thinkers.	Synthesize new information with what they already know.	Don't pass judgment immediately.	Overcome their personal prejudices.	Listen carefully to others.
	Are sensitive to the emotions of others.	Have specialized knowledge about a topic.	Try to question everything.	Evaluate the logic of arguments.	Make logical arguments.	Overcome their cultural biases.	Understand multicultural perspectives.	
			Think from an ethical or moral position.	Communicate their opinion effectively.	Take a neutral attitude towards an issue.			
			Find ways to accommodate the opinions of others.	Have knowledge of global issues.	Evaluate the reliability of sources.			
				Try to test or challenge conventional wisdom.				

Fig. 4. Composite Q-sort for factor 1.

-4	-3	-2	-1	0	1	2	3	4
Take a cynical attitude towards a problem or issue.	Ask the right questions.	Find ways to accommodate the opinions of others.	Come up with new ways of thinking about a problem or issue.	Have persuasive writing and presentation skills	Communicate their opinion effectively.	Make logical arguments.	Overcome their personal prejudices.	Evaluate the reliability of sources.
Take a positive attitude towards an issue.	Have specialized knowledge about a topic.	Do not necessarily have specialized knowledge about a topic.	Are sensitive to the emotions of others.	Reflect on their own thinking.	Take a neutral attitude towards an issue.	Separate their thoughts from feelings and emotions.	Evaluate the logic of arguments.	Evaluate information independently.
	Try to question everything.	Are creative thinkers.	Think from an ethical or moral position.	Overcome their cultural biases.	Challenge the opinions of others.	Analyze how claims for truth are made.	Synthesize new information with what they already know.	
			Have a flexible attitude towards an issue.	Don't pass judgment immediately.	Listen carefully to others.			
			Have knowledge of global issues.	Take a broad perspective and look at "the bigger picture".	Understand multicultural perspectives.			
				Try to test or challenge conventional wisdom.				

Fig. 5. Composite Q-sort for factor 2.

-4	-3	-2	-1	0	1	2	3	4
Take a positive attitude towards an issue.	Separate their thoughts from feelings and emotions.	Have knowledge of global issues.	Take a neutral attitude towards an issue.	Communicate their opinion effectively.	Have a flexible attitude towards an issue.	Don't pass judgment immediately.	Take a broad perspective and look at "the bigger picture".	Evaluate the logic of arguments.
Take a cynical attitude towards a problem or issue.	Find ways to accommodate the opinions of others.	Have specialized knowledge about a topic.	Think from an ethical or moral position.	Overcome their personal prejudices.	Synthesize new information with what they already know.	Ask the right questions.	Analyze how claims for truth are made.	Evaluate the reliability of sources.
	Are sensitive to the emotions of others.	Do not necessarily have specialized knowledge about a topic.	Overcome their cultural biases.	Understand multicultural perspectives.	Try to test or challenge conventional wisdom.	Come up with new ways of thinking about a problem or issue.	Make logical arguments.	
		Evaluate information independently.	Are creative thinkers.	Listen carefully to others.				
		Try to question everything.	Challenge the opinions of others.	Reflect on their own thinking.				
			Have persuasive writing and presentation skills					

Fig. 6. Composite Q-sort for factor 3.

-4	-3	-2	-1	0	1	2	3	4
Are sensitive to the emotions of others.	Take a positive attitude towards an issue.	Do not necessarily have specialized knowledge about a topic.	Find ways to accommodate the opinions of others.	Listen carefully to others.	Analyze how claims for truth are made.	Evaluate the logic of arguments.	Take a broad perspective and look at "the bigger picture".	Separate their thoughts from feelings and emotions.
Reflect on their own thinking.	Take a cynical attitude towards a problem or issue.	Ask the right questions.	Communicate their opinion effectively.	Challenge the opinions of others.	Synthesize new information with what they already know.	Understand multicultural perspectives.	Take a neutral attitude towards an issue.	Make logical arguments.
	Evaluate information independently.	Have knowledge of global issues.	Try to question everything.	Don't pass judgment immediately.	Evaluate the reliability of sources.	Overcome their cultural biases.	Have a flexible attitude towards an issue.	
		Have specialized knowledge about a topic.	Try to test or challenge conventional wisdom.	Come up with new ways of thinking about a problem or issue.				
		Think from an ethical or moral position.	Have persuasive writing and presentation skills	Overcome their personal prejudices.				
		Are creative thinkers.						

Fig. 7. Composite Q-sort for factor 4.

Table 3

Distinguishing statements for factor 1 by factor array and z-score.

Statement	Factor 1	Factor 2	Factor 3	Factor 4
22. Have a flexible attitude towards an issue.	+4 1.76	-1 -0.48	+1 0.52	+3 1.09
5. Listen carefully to others.	+4 1.62	+1 0.54	+1 0.35	0 0.49
7. Take a broad perspective and look at “the bigger picture”.	+3 1.5	0 0.09	+3 1.42	+3 1.14
14. Understand multicultural perspectives.	+3 1.21	+1 0.41	0 0.13	+2 0.72
27. Reflect on their own thinking.	+2 1.13	0 0.27	+1 0.34	-4 -2.37
13. Overcome their cultural biases.	+2 0.9	0 0.14	-1 -0.48	+2 0.66
10. Have knowledge of global issues.	0 -0.12	-1 -0.52	-2 -0.67	-2 -0.81
32. Evaluate the logic of arguments.	0 -0.01	+3 1.2	+4 2.13	+2 0.97
23. Analyze how claims for truth are made.	-1 -0.47	+2 0.8	+3 1.24	+1 0.63
28. Have persuasive writing and presentation skills.	-2 -1.02	0 0.39	0 -0.11	0 0.01
29. Challenge the opinions of others.	-3 -1.21	+1 0.6	0 -0.06	0 0.41

Table 4

Distinguishing statements for factor 2 by factor array and z-score.

Statement	Factor 1	Factor 2	Factor 3	Factor 4
21. Evaluate the reliability of sources.	+1 0.45	+4 1.54	+4 1.54	+1 0.52
30. Evaluate information independently.	-4 -1.51	+4 1.53	-1 -0.61	-3 -1.91
20. Overcome personal prejudices.	+3 1.23	+3 1.51	0 -0.18	+1 0.5
26. Synthesize new information with what they already know.	+1 0.63	+3 1.01	+1 0.43	+1 0.57
27. Challenge the opinions of others.	-3 -1.21	+1 0.6	0 -0.06	0 0.41
28. Have persuasive writing and presentation skills.	-2 -1.02	0 0.39	0 -0.11	0 0.01
7. Take a broad perspective and look at “the bigger picture”.	+3 1.5	0 0.09	+3 1.42	+3 1.14
22. Have a flexible attitude towards an issue.	+4 1.76	-1 -0.48	1 0.52	+3 1.09
11. Are creative thinkers.	0 0.03	-2 -1.16	0 0.05	0 -0.02
8. Ask the right questions.	-2 -0.97	-3 -1.19	+2 0.94	-2 -0.77
1. Try to question everything.	-1 -0.57	-3 -1.46	-1 -0.66	-1 -0.43

Gender provides few clear insights into the breakdown of the groups. With a total of 16 male and 22 female students (a 42/58 percent split), all four factors have more female than male students. Factor three is a near equal split, whereas factors one and four have a higher proportion of female students. The four students in factor two are all female.

Therefore, the clearest distinction that can be made is between the two programs, which is also a distinction between a multicultural international student group (factors two and three), and a more ‘homogeneous’ Japanese group (factors one and four). This Japanese group is made up of two factors: ‘flexible and multicultural thinkers’ (factor one), and ‘balanced, flexible evaluators’ (factor 4). Across these two factors, flexibility and perspective taking can be said to most clearly characterize the conception of CT, with the largest, factor one group rejecting the importance of logical argumentation, while factor four incorporate it.

With the international group (factor two and three), both factors considered logical argumentation paramount. Factor two, the ‘independent evaluators’ are most clearly focused on evidence evaluation in their definition of CT, and reject perspective taking and flexibility. The ‘inquisitive innovators’ of factor three however, relate logical argumentation to problem solving, and include questioning, breaking with convention, and coming up with new ideas in their conception of CT.

Table 5

Distinguishing statements for factor 3 by factor array and z-score.

Statement	Factor 1	Factor 2	Factor 3	Factor 4
32. Evaluate the logic of arguments.	0 −0.01	+3 1.2	+4 2.13	+2 0.97
21. Evaluate the reliability of sources.	+1 0.45	+4 1.54	+4 1.54	+1 0.52
7. Take a broad perspective and look at “the bigger picture”.	+3 1.5	0 0.09	+3 1.42	+3 1.14
23. Analyze how claims for truth are made.	−1 −0.47	+2 0.8	+3 1.24	+1 0.63
9. Don’t pass judgement immediately.	+2 0.95	0 0.07	+2 1.02	0 0.33
8. Ask the right questions.	−2 −0.97	−3 −1.19	+2 0.94	−2 −0.77
31. Come up with new ways of thinking about a problem or issue.	0 0.3	−1 −0.29	+2 0.67	+1 0.52
4. Try to test or challenge conventional wisdom.	0 −0.13	0 −0.23	+1 0.4	0 0.25
11. Are creative thinkers.	0 0.03	−2 −1.16	0 0.05	0 −0.02
14. Understand multicultural perspectives.	+3 1.21	+1 0.41	0 0.13	+2 0.72
20. Overcome personal prejudices.	+3 1.23	+3 1.51	0 −0.18	+1 0.5
13. Overcome their cultural biases.	+2 0.9	0 0.14	−1 −0.48	+2 0.66
25. Separate their thoughts from feelings and emotions.	+1 0.69	+2 0.86	−3 −1.15	+4 1.67
17. Find ways to accommodate the opinions of others.	−1 −0.79	−2 −0.85	−3 −1.26	−1 −0.18
	−0.79	−0.85	−3 −1.26	−1 −0.18

Table 6

Distinguishing statements for factor 4 by factor array and z-score.

Statement	Factor 1	Factor 2	Factor 3	Factor 4
25. Separate their thoughts from feelings and emotions.	+1 0.69	+2 0.86	−3 −1.15	+4 1.67
2. Make logical arguments.	+1 0.59	+2 0.94	+3 1.18	+4 1.39
12. Take a neutral attitude towards an issue.	+1 0.45	+1 0.68	−1 −0.33	+3 1.1
17. Find ways to accommodate the opinions of others.	−1 −0.79	−2 −0.85	−3 −1.26	−1 −0.18
10. Have knowledge of global issues.	0 −0.12	−1 −0.52	−2 −0.67	−2 −0.81
30. Evaluate information independently.	−4 −1.51	+4 1.53	−1 −0.61	−3 −1.91
16. Are sensitive to the emotions of others.	−3 −1.4	−1 −0.35	−3 −1.39	−4 −1.91
27. Reflect on their own thinking.	+2 1.13	0 0.27	1 0.34	−4 −2.37

5. Discussion: Student’s identity construction as critical thinkers in EMI

What can therefore be most clearly stated from this complex range of views, is that the association between critical thinking and a flexible, broad-minded attitude is characteristic of the homogeneous Japanese group, and not of the international student’s group. Hints of this inclination towards flexibility and perspective taking among Japanese students are present in the findings of some previous studies. A tendency among Asian students toward dialectical thinking was noted earlier in Lun, Fisher and Ward’s study (2010), while Manalo et al. found that Japanese students from both Okinawa and Kyoto valued ‘consideration of others’ as a quality of critical thinking, though they suggest such differences could have as much to do with educational environment as they do with culture. (Manalo et al., 2015, p. 313). Other studies identify the influence of motivation, instructor expectations and other students as factors influencing student’s evolving identities (Duff & Uchida, 1997, qtd. in McKinley, 2017, p. 230). This suggests a complex range of influences could be shaping the participants’ views of CT, some of which have particular connections to the context of EMI programs in Japan.

Culture may in fact contribute to the tendency of Japanese students to view introspection as critical, to hesitate to pass judgement,

Table 7

Breakdown of universities, nationalities and genders across four factors.

	Total number of Q-sorts	Students from University A. (Japanese)	Students from University B. (International)	Nationalities of students	Gender
Factor 1	16	13	3	Japan (14) Korea (1) China (1)	Male: 5 Female: 11
Factor 2	4	0	4	Japan (2) Malaysia (1) China (1)	Male: 0 Female: 4
Factor 3	9	1	8	Japan (2) Korea (2) Philippines (1) Taiwan (1) Sweden (1) Australia (1)	Male: 4 Female: 5
Factor 4	9	8	1	Japan (7) Philippines (1) China (1)	Male: 7 Female: 13

and to place less importance in logical analysis. While some might interpret this as a failure to grasp the essence of critical thinking as it is understood in a Western paradigm, rather it can be indicative of the way CT operates in a high-context culture, where cautious observation, deferment of judgement and flexibility must be exercised in order to critically evaluate issues. An assertive rhetorical approach to argumentation is less effective here. Turner argues that attentive listening is viewed as proactive in East Asian cultures, while it might be interpreted as passive in the West (Turner, 2011, p. 97) One function of culture, as Edward T. Hall wrote: 'is to provide a highly selective screen between man and the outside world' (Hall, 1989, p. 85). If culture is viewed as an interface or schema in this way – a cohesive social construct - then critical thinking is cultural thinking in the sense that it is needed to navigate and filter the culture, and must be done differently according to context. The filtering mechanism in the model of CT proposed earlier (Scriven & Paul, 1996; see Fig. 1) mediates cultural schema, and its focus on the process of conceptualizing, applying, analyzing, synthesizing and evaluating as core CT skills works across cultural boundaries.

The social structures that underlie different educational environments that the students have experienced may also shape their understanding. Those who have experienced an international education may have a view of CT that is more output-oriented because they have been instructed in and assessed on their ability to construct and present logical arguments. Although educational reforms in Japan have aimed to incorporate such qualities into the classroom practice of Japanese schools (Central Council of Education, 2008), the reality is that much of what Japanese students experience in their pre-tertiary education is still centered around assessment on standardized tests. The weight given to these tests for university entrance leaves little time for the development of other skills, and classroom practice in the Japanese public-school system is still dominated by a teacher-centered "chalk and talk" model (Yamamoto et al., 2016, p. 42). Students who succeed in this environment may well be inclined to view receptive skills such as listening carefully, or understanding multiple perspectives as critical.

The strong influence that instructor expectations have on a student's construction of an identity in the classroom is identified in other studies (Manalo et al., 2015, p. 313; McKinley, 2017). Here, the instructors of the two critical thinking courses may have taken a similar general approach, but there are invariably idiosyncrasies to their teaching that have influenced their students. Despite the existence of many standard definitions of critical thinking, educators and practitioners often feel the need to develop a personal or working definition that helps students grasp the particular skills they will need to use in that class (Esterle & Clurman, 1993). In this study, statement 23: "analysing how claims for truth are made" was in fact the personal definition used in class by the professor instructing the course at University B (this instructor had participated as an interviewee in a previous study, and the statement had been taken from the interview transcript). This statement was valued highly by students from factor two and three, which mostly consisted of students from this instructor's class, while it was rated negatively by factor one. Although no single definition was explicitly used by the instructor from University A, weekly classroom practice involved 'fishbowl discussions' in which a small group of students would participate in a discussion or debate, and other students would observe, take notes, and complete a written reflection task. This could be a reason that factor one and four students rated listening to others and self-reflection highly. In this manner, the particular emphases given by each instructor, whether explicit or implied, may be assimilated by students and come to shape their understanding.

Broader social discourses surrounding critical thinking could also have had some influence. Perspective taking is frequently associated with CT in university mission statements, and government discourses in Japan (Gyenes, 2019; Hofmeyr, 2021, p. 8). In fact, statements 10 ('Have knowledge of global issues'), and 14 ('Understand multicultural perspectives') were drawn from university mission statements. Students may have encountered the term critical thinking through these, or other related texts, and as a result have made an association between critical thinking and perspective taking. These discourses are strongly connected to the image of globally minded human resources or *global jinrai* in Japan and indeed, students from University A. are part of their faculty's '*Global Jinzai*' program, so there is an affinity between their personal aims and these discourses, as may be the case for many students attracted to EMI courses and programs.

Finally, the influence that students have on one another should not be disregarded. Students in the two groups may have discussed

the meaning of critical thinking with their classmates, or they may not have. Regardless, coming into undergraduate programs with limited experience to guide them in a new environment, it can be expected that they rely on their peers as models by which to position and adjust their academic identity. This is especially the case in an EMI environment where this identity needs to be performed in English, and given the correlation between language proficiency and critical thinking performance (Lun et al., 2010; Manalo & Sheppard, 2016), less proficient L2 English users will look to their more proficient peers for guidance in spoken genres such as discussion and debate. This process can in turn shape their image of an effective critical thinker. In the case of this study, the particular circumstances of EMI programs in Japan may have influenced the students. The atomization of Japanese students on the one hand, into domestic, 'internationalization at home' programs, and international students into separate programs that effectively operate as international student bubbles on Japanese campuses (Ota & Horiuchi, 2018) could be understood to play a role in perpetuating the distinct versions of critical thinking conceived by the two groups in this study. A program that brings Japanese and international students into the same classroom for a critical thinking course might bear different results and a greater synthesis of understandings. There is potential for further investigation in programs like this in other Japanese universities.

6. Conclusion

A complex picture emerges of the influences shaping the conceptions of critical thinking in the two student groups. While Q methodology offers a detailed description of this complexity to help reveal what these views are, it offers few clear answers as to how they have been shaped, and while cultural and educational background, social discourse, instructor expectations, other students and language proficiency have been identified as factors that could have influenced the participants in this study, it is difficult to conclusively ascribe more influence for any one of these over the others. It is also important to note that while Q methodology has grouped the 39 students into four factors, no two students within one factor arranged the statements on the grid in the same way, and while each factor is a composite of the students that are in it, none of those students' completed Q-sorts match the composite Q-sort exactly (the highest degree of correlation is 70–75%; see appendix B). Each Q-sort is unique, reflecting the individuality of the participants, and the influences that have shaped each person's view will also vary from person to person.

This is well illustrated by one student's reflection on the survey. Upon completing the Q-sort, each student was given an opportunity to comment freely on the survey and their own q-sorts. While most responses offered few clues as to what influenced them, one Japanese student from the factor one group wrote a comment that articulates why this student thought that seeing from various perspectives was paramount:

I think that critical thinkers don't necessarily need persuasive writing and presentation skills. That is not so important for just being a critical thinker. And obstacles to becoming a critical thinker are prejudice, bias and being selfish. Specialized knowledge sometimes becomes an obstacle to look at issues from a neutral perspective, but the wider the knowledge you collect, the easier it is for you to think critically.

Whether this student's conception of critical thinking was shaped by their culture, their educational experiences, their instructor, classmates, or by wider social discourse is difficult to say, but what is clear is that they have thought critically about the question, and taken a balanced, reasoned and independent view that is very much their own. The two student groups investigated here can be seen to encapsulate the twin aims of internationalization to bring international talent into Japanese universities and develop the global competencies of Japanese students, and shows some discrepancy in the way students conceive CT from each perspective. Yet while critical thinking might be a contested concept in education discourses in Japan, and different ideologies might compete to shape what happens in the classroom, the quotation shows that students also have agency: to navigate, filter and nuance their own views, as they shape their own understanding.

Author statement

The author hereby declare that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

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Appendix A. Q-sample statements and factor arrays (with Z-scores) for 4 factors

	Statement about critical thinkers	Factor 1	Factor 2	Factor 3	Factor 4
1	Try to question everything.	-1 -0.57	-3 -1.46	-1 -0.66	-1 -0.43
2	Make logical arguments.	1 < 0.59	2 0.94	3 1.18	4 1.39 >
3	Take a negative attitude towards an issue.	-4 -1.82	-4 -2.03	-4 -1.96	-3 > -1.4
4	Try to test or challenge conventional wisdom.	0 -0.13	0 -0.23	1 0.4 >	0 0.25
5	Listen carefully to others.	4 1.62 >	1 0.54	1 0.35	0 0.49
6	Have specialized knowledge about a topic.	-2 -1.08	-3 < -1.27	-2 -0.87	-1 -0.44
7	Take a broad perspective and look at “the bigger picture”.	3 1.5	0 < -0.09	3 1.42	3 1.14
8	Ask the right questions.	-2 -0.97	-3 < -1.19	2 0.94 >	-2 -0.77
9	Don’t pass judgment immediately.	2 0.95	0 0.07	2 1.02	0 0.33
10	Have knowledge of global issues.	0 -0.12	-1 -0.52	-2 -0.67	-2 -0.81
11	Are creative thinkers.	0 0.03	-2 < -1.16	0 0.05	0 -0.02
12	Take a neutral attitude towards an issue.	1 0.45	1 0.68	-1 < -0.33	3 1.1 >
13	Overcome their cultural biases.	2 0.9	0 0.14	-1 -0.48	2 0.66
14	Understand multicultural perspectives.	3 1.21 >	1 0.41	0 < 0.13	2 0.72
15	Communicate their opinion effectively.	0 -0.08	1 0.77	0 0.29	-1 -0.32
16	Are sensitive to the emotions of others.	-3 -1.4	-1 -0.35 >	-3 -1.39	-4 < -1.91
17	Find ways to accommodate the opinions of others.	-1 -0.79	-2 -0.85	-3 < -1.26	-1 -0.18 >
18	Think from an ethical or moral position.	-1 -0.72	-1 -0.42	-1 -0.39	-1 -0.58
19	Take a positive attitude towards an issue.	-3 -1.16	-4 -2.03	-4 -1.9	-3 -1.05

20	Overcome their personal prejudices.	3 1.23	3 1.51 >	0 < 0.18	1 0.5
21	Evaluate the reliability of sources.	1 0.45	4 1.54	4 1.54	1 0.52
22	Have a flexible attitude towards an issue.	4 1.76 >	-1 < -0.48	1 0.52	3 1.09
23	Analyze how claims for truth are made.	-1 < -0.47	2 0.8	3 1.24 >	1 0.63
24	Do not necessarily have specialized knowledge about a topic.	-1 -0.38	-2 -0.89	-2 -1.00	-2 -0.76
25	Separate their thoughts from feelings and emotions.	1 0.69	2 0.86	-3 < -1.15	4 1.67 >
26	Synthesize new information with what they already know.	1 0.63	3 1.01	1 0.43	1 0.57
27	Reflect on their own thinking.	2 1.13 >	0 0.27	1 0.34	-4 < -2.37
28	Have persuasive writing and presentation skills	-2 < -1.02	0 0.39 >	0 -0.11	0 0.01
29	Challenge the opinions of others.	-3 < -1.21	1 0.6 >	0 -0.06	0 0.41
30	Evaluate information independently.	-4 -1.51	4 1.53 >	-1 -0.61	-3 < -1.91
31	Come up with new ways of thinking about a problem or issue.	0 0.3	-1 -0.29	2 0.67	1 0.52
32	Evaluate the logic of arguments.	0 < -0.01	3 1.2	4 2.13 >	2 0.97

Factors with a notable highest Z-score for certain statements highlighted in yellow.

Factors with a notable lowest Z-score for certain statements highlighted in blue.

. (continued).

Appendix B. Q-sort factor loadings for 39 student participants

Q sort	Factor 1	Factor 2	Factor 3	Factor 4
1 B 1 F Phi.	-0.1201	-0.0432	0.6047 *	0.3826
2 B 2 F Vie.	0.2981	0.1062	0.6178 *	0.4206
3 B 3 F Phi.	-0.0518	-0.3065	0.4099	0.6844 *
4 B 4 F Tai.	0.0036	0.3846	0.6141 *	0.3746
5 B 5 F Mal.	0.1673	0.6647 *	0.1013	0.0821
6 B 6 F Kor.	0.7194 *	0.1366	0.4145	0.1616
7 B 7 F Chi.	0.4637	0.2962	0.4475	0.3581
8 B 8 F Chi.	0.1865	0.7159 *	0.3525	0.1857
9 B 9 F Swe.	0.2983	0.2212	0.4456 *	0.2799
10 B 10 F Jpn.	0.2076	0.6067 *	0.4233	0.2046
11 B 11 F Jpn.	0.574 *	0.085	0.4309	0.2889
12 B 12 F Jpn.	0.0798	0.2149	0.7406 *	0.0063
13 B 13 F Jpn.	0.0979	0.4792 *	0.0809	0.227
14 B 14 M Jpn.	0.5882 *	-0.0064	0.375	0.2844
15 B 15 M Aus.	0.3248	-0.059	0.523 *	-0.4127
16 B 16 M Kor.	0.3032	0.0597	0.5451 *	0.1448
17 B 17 M Kor.	0.2993	0.0896	0.7581 *	0.1159
18 A 1 M Jpn.	0.5472 *	-0.1864	-0.0452	0.1838
19 A 2 M Jpn.	0.0253	0.1334	0.2721	0.7161 *
20 A 3 F Chi.	0.6793 *	0.2275	-0.065	0.2223
21 A 4 M Jpn.	0.3852	0.0977	0.0743	0.4207 *
22 A 5 M Jpn.	0.4949 *	0.1329	0.2707	-0.0372
23 A 6 M Jpn.	0.5457	0.2413	-0.0022	0.6328 *
24 A 7 M Jpn.	0.3886	0.198	0.0994	0.6305 *
25 A 8 M Jpn.	0.3112	0.1165	0.1026	0.7325 *
26 A 9 F Jpn.	0.6465 *	-0.4087	0.2455	0.108
27 A 10 M Jpn.	0.7904 *	0.1426	0.1118	0.1157
28 A 11 M Jpn.	0.6847 *	0.0893	0.28	0.0268
29 A 12 M Jpn.	0.3113	-0.4622	-0.0505	0.3943 *
30 A 13 M Jpn.	0.1999	0.3028	0.1734	0.4998 *
31 A 14 M Jpn.	0.3802	-0.6091	0.4885 *	0.0378
32 A 15 F Chi.	0.2593	0.0907	0.1271	0.6787 *
33 A 16 F Jpn.	0.4565 *	-0.049	0.1238	0.3287
34 A 17 F Jpn.	0.6492 *	-0.0231	0.1743	0.1061
35 A 18 F Jpn.	0.49 *	0.1706	0.0718	0.2865

36	A 19 F Jpn.	0.5779	*	0.0547	0.1901	0.3741
37	A 20 F Jpn.	0.6931	*	0.0285	-0.0121	0.0397
38	A 21 F Jpn.	0.7069	*	0.1791	0.1133	0.3656
39	A 22 F Jpn.	0.6266	*	0.076	0.2288	0.0534
% Explained variance		21%	8%	13%	13%	

* Indicates factor loading (highlighted in 4 colours).

Note: This table accounts for 38 of the total of 39 students. Student 7's factor loadings (indicated in red) were split across two factors and they could not be clearly flagged for any of the four factors.

Nationalities:
 Aus. - Australian
 Chi. - Chinese
 Jpn. - Japanese
 Kor. - South Korean
 Mal. - Malaysian
 Phi. - Philippines
 Swe. - Swedish
 Tai. - Taiwanese
 Vie. - Vietnamese

. (continued).

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