

Bachelor's Thesis

Implementation of Critical Thinking in education, in Russia and The Netherlands

Maaïke Wientjes

Applied Psychology



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Implementation of Critical Thinking in education, in Russia and The Netherlands

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and a Russian State University

Thesis written by:

Name: Maaïke Wientjes
Student: 335840

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Supervised by:

First supervisor: Dr. L. Ekkel
Second supervisor: Dr. M. Smeerdijk

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Preface

Proudly I present my bachelor thesis 'Implementation of Critical Thinking in education, in Russia and The Netherlands'. After an intense semester, I am able to say that I did it! After deciding to quit at my former commission company, I was worried I may graduate with a study delay. Luckily, I found a new, interesting project in a short time, an international project in Critical Thinking. I felt excited, but I was also worried to write my bachelor thesis in a short time and in the English language. Now at the ending of this project, I can say that I was worried for nothing. I worked hard, which resulted in meeting the deadline in time. Also, writing in English was not as hard as I thought. I actually enjoyed doing research! I am proud of myself to write this thesis in a short time and in the English language. During the process of writing I learned to trust myself and to rely on my own skills and knowledge.

I want to thank several people. Firstly, I want to thank dr. Ekkel for the great opportunity. I really felt honoured when he invited me to participate in this project. Also, his enthusiasm, feedback and discussions helped me write this thesis. Secondly, my thanks go out to the professor in Russia for the collaboration, the interesting Skype-meetings and the feedback. Dr. Smeerdijk has to be thanked for his feedback and support. Also, Ruud Dongstra has to be thanked for his collaboration in this project. Furthermore, my thanks go out to the students and lecturers who filled in the questionnaire. I also like to thank my fellow students for the support, feedback, the many help they gave me and the endless amount of coffee we drank together. Lastly, thanks to my significant other, family and friends for the moments of relaxation, which were very welcome from time to time. All these people helped me to write the thesis as it is now. I hope you enjoy reading it.

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Abstract

Critical Thinking (CT) is an important skill to develop among students. Thinking critically has many benefits, such as being able to handle complex problems and to make better decisions. Also, thinking critically leads to a deeper understanding of a subject. In order to improve CT skills, it has to be taught to students. Embedding CT in the curriculum leads to the largest improvement. The research question in this thesis is: "In which way can Critical Thinking be implemented in the curriculum, in order to enhance the level of Critical Thinking among bachelor Applied Psychology students of the Dutch University of Applied Sciences and bachelor Psychology students of the Russian State University?" Two important components of this thesis are the cultural factors of CT and the development of an intervention in order to improve CT.

CT consists of skills and dispositions. Examples of skills are: analyzing, evaluating and reflecting. Being honest, inquisitive and truth-seeking are examples of dispositions. Cultural factors influence the ability to think critically. Hence, some authors argue that Asian students tend to think less critically than European students. In order to teach students to think critically, their teachers must have CT skills as well. In order to improve CT skills among students, an implementation will be set up. There are several conditions for an implementation of CT, such as a student-centred environment where students are stimulated to ask questions.

CT among the Dutch University of Applied Sciences (DUAS) and the Russian State University (RSU) students is measured with a survey, called the Hirayama and Kusumi's Critical Thinking Scale (CT-HK). Students were approached during classes, which makes this research a selective cluster sample. At RSU, students filled in the questionnaire by paper and pencil. At the DUAS, the students filled in the questionnaire in an online environment. Also, lecturers of the DUAS gave their opinion on the level of CT among their students, by filling in the lecturer version CT-HK as well. In this version, the words 'I' and 'me' were replaced by 'the student', to make the questions suitable for the lecturers.

At the RSU 38 students filled in the questionnaire. 86 students and 14 lecturers of the DUAS filled in the CT-HK. The found Cronbach's Alpha of the CT-HK was low, while the reliability of the lecturer version of the CT-HK was good. Results showed that the students of both Saxion and RSU estimated their level of CT as high. The students of the RSU scored significantly higher at the subscales Inquisitiveness and Evidence Seeking. The lecturers of the DUAS estimated the level of CT among their students significantly lower than the students did themselves. At the DUAS, all components of CT should be enhanced, with a focus on Evidence Seeking and Objectiveness. At the RSU, Objectiveness needs the most attention.

There are factors that may have distorted the results, such as a social desirability bias and an over-estimation of the students. The low response rate, the low reliability and the poor aspects of the validity are limitations in this research. Therefore, it is recommended to use other instruments besides the CT-HK. The main goal of this research was to design a customized intervention. There are general interventions recommended, and there are recommendations for each aspect of CT, namely the logical attitude skills, the reasoning skills, the evidence seeking skills and the disposition to be objective. For all these aspects, several exercises are developed. It is proposed in which course they could be embedded.

Note: this version differs from the original bachelors' thesis as hand in by the supervisors. In this bachelor thesis the names of the commission companies are anonymized, in accordance with the desire of the RSU. In the original bachelor's thesis the names of the commission companies are used, but the RSU desired anonymity in published documents.

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1. Introduction

In this chapter, the research is introduced. The research is commissioned by a Dutch University of Applied Sciences, (from now: DUAS) and a Russian State University (RSU). In paragraph 1, the background and the significance of researching Critical Thinking (CT) are described. The research question is composed in paragraph 2. Finally, in paragraph 3, the research goals are addressed.

1.1 Background and Significance

In this paragraph, the definition and the importance of CT is illustrated. At The DUAS and RSU, there is no dedicated attention given to CT yet. The following paragraph explains why this is a shortcoming and how it should be solved.

1.1.1 Definition

There are several definitions of CT, but researchers all agree that skills and dispositions related to reasoning are involved in CT (Bensley & Murtagh, 2012). Examples of cognitive skills are interpretation, analysis, evaluation, inference, explanation, and self-regulation. Affective dispositions that will make one an ideal Critical Thinker are: being inquisitive, analytical, truth seeking, open-minded, flexible, prudent in making judgements and willing to reconsider his opinions (Facione, 1990; Facione, 2015). In chapter 2, the definition is elaborated further.

Students in higher education are lacking in CT (Carrithers, Ling & Bean, 2008; Flores, Matkin, Burbach, Quinn, & Harding, 2010; Weiler, 2004). According to Case, “every curriculum document mentions the importance of critical thinking, and the need of making thoughtful judgements, but the extent and manner of critical thinking in schools is disheartening” (Case, 2005, p. 45). In the curriculum of Applied Psychology at The DUAS there is no explicit attention to CT. In the curriculum of Psychology at RSU, there is one course Argumentation, but this course does not include all elements of CT. This should change, because CT is generally considered to be an important competence to develop among students.

1.1.2 Importance of Critical Thinking

A lack of CT skills among students is alarming, because there are many benefits of CT. Firstly, thinking critically leads to confident decisions and these decisions are more likely to have the outcomes as desired (Brookfield, 2007). Also, students are more able to handle complex problems with confidence (Cottrell, 2005). Further, students gather a lot of information through the internet nowadays (Weiler, 2004). To differentiate useful, valid information from the so-called ‘gray area’, CT is important, because complex reasoning is needed to determine the validity of resources (Weiler, 2004; Paul & Elder, 2008).

Furthermore, developing CT skills ensures that students become more capable of quickly identifying key points in a text, instead of reading the whole document and getting distracted by irrelevant information (Cottrell, 2005). Additionally, with adequate CT skills, one is being aware of influences in one’s assumptions, beliefs, norms and values. Developing adequate CT skills means that students can filter information in order to make accurate judgements (Cottrell, 2005). Also, CT helps students understand the subject on a deeper level than just the surface (Cottrell, 2005). Bodner (1988) found that chemistry students were unable to apply their knowledge to other fields, due to a lack of CT

skills. This applies not only to chemistry students but also to other students, Cottrell (2005) argues. Embedding CT in the curriculum is needed (Case, 2005; Flores, et al., 2010).

Additionally, CT can be considered as a 'meta-competence'. Meta-competences are not context-specific competences, but are universal competences, that can be used to master other competences and skills (Dries et al. and De Moor, both as cited in Gloudeman, Schalk, & Reynaert, 2010). Giving attention to details, identifying trends and patterns, taking different perspectives, being objective, and considering implications and distant consequences are some aspects of CT (Cottrell, 2005). These skills are transferable to different situations and are needed to become a full potential professional, who is capable of facing today's economic, environmental and social challenges (Pellegrino & Hilton, 2001; Halpern, 2002).

Lastly, CT can be considered as an essential skill for nurses in health care, because they are expected to make appropriate decisions that affect patients' health progress. These decisions have to be made in an adequate way. Practicing making decisions during study, is a safe way for nurse students to improve their CT skills (Fitzpatrick as cited in Spencer, 2008). After their graduation, bachelor (Applied) Psychology students are likely to make decisions that affect patients as well. CT helps make better decisions (Brookfield, 2007; Cottrell, 2005; Helsdingen, Van den Bosch, Van Gog, & Merriënboer, 2010), so it's important for bachelor (Applied) Psychology students to develop and practice these skills during their study. In summary, CT can be regarded as a great skill because it brings many benefits, and it can be used in various situations.

1.1.3 Interventions for enhancing Critical Thinking

Giving instructions to students on how to think critically, leads to an improvement of CT among them (Abrami et al., 2008; Case, 2005; Durr, Lahart, & Maas, 1999; Niu, Behar-Horenstein, & Garvan, 2013; Ku, Ho, Hau, & Lai, 2014). Based on this principle, there are dozens of ideas and guidelines to improve CT. For example, Durr, Lahart and Maas (1999) set up an intervention to improve CT among students. This intervention included multiple activities, with a focus on the critical use of language (reading and speaking). The activities were implemented in the curriculum and were scheduled on a weekly basis. Results of this research showed an increased level of CT among the students due to the intervention. Niu, et al. (2013) also found that interventions lead to a higher level of CT among students. Arbrami et al. (2008) found that teaching CT as an independent track within a specific content course leads to the largest enhancement. In addition, Heijltjes, Van Gog and Paas (2014) found that 'explicit instruction combined with practice is required to improve CT' (p. 1). Lastly, Ten Dam and Volman (2004) argue that the interventions must focus on developing the epistemological (the study of knowledge; Stanford Encyclopedia of Philosophy, 2005) beliefs of students, guarantee interaction between students and stimulate active learning and problem solving with real life situations, in order to improve CT. These examples show many different views on how to improve CT among students, but universities such as The DUAS and RSU, cannot tell which of those will fit their students best. Therefore, research in order to design a customized intervention is needed.

An intervention that meets the needs of students leads to a larger improvement (Kok, Mollema, Saan & Ploeg, 2012). Because CT is an ongoing process (Browne & Keeley, 2005), one intervention at a single moment, will not be sufficient enough. Therefore, embedding CT in the curriculum is needed (Case, 2005; Flores et al., 2010). It is proven that embedding CT in the curriculum has positive effects

(Halpern, 2002). To achieve this, research to define the level of CT among students, is essential. As mentioned, CT includes diverse skills and dispositions (Facione, 1990). The research as described in this thesis, will investigate which CT skills students have mastered already, and which components could use and improvement. Based on these high and low scored components, an intervention will be developed, in order to improve the low scored CT components. In summary, this research is an endeavour to find the best fitting implementation for students of DUAS and RSU.

1.2 Research Question

Based on the background and significance, the following research question is formed:

In which way can Critical Thinking be implemented in the curriculum, in order to enhance the level of Critical Thinking among bachelor Applied Psychology students of the Dutch University of Applied Sciences and bachelor Psychology students of the Russian State University?

Based on this research question, the following sub questions are formed:

- 1. To what extent differs the current level of Critical Thinking among bachelor Applied Psychology students at the Dutch University of Applied Sciences, from the bachelor Psychology students at the Russian State University?*
- 2. To what extent are the students of bachelor Applied Psychology at the Dutch University of Applied Sciences thinking critically, according to their lecturers?*
- 3. To what extent does the students' level of Critical Thinking, as determined by the students in bachelor Applied Psychology of the Dutch University of Applied Sciences, correspond to their level of CT as determined by their lecturers?*
- 4. Which components of Critical Thinking should be enhanced at the Dutch University of Applied Sciences and the Russian State University, in accordance with the findings on the former sub questions?*

1.3 Research Goals

This research will be done on behalf of a Dutch University of Applied Sciences and a Russian State University. The Dutch University of Applied Sciences is an institution of higher education in the Netherlands and offers more than 60 studies and 15 master's programmes over 26,000 students . This research will be done among second year Applied Psychology students. The Russian State University (RSU) is a Russian university with 17,000 students. The university contains 23 faculties and offers 165 master's programmes. Their faculty of Psychology consist of seven departments and six laboratories. At RSU, this research will be done among second year Psychology students. DUAS and RSU have committed a partnership to research cross cultural aspects of CT in education. With this partnership, DUAS and RSU attempt to improve the level of CT among their students in (Applied) Psychology.

The main goal of this research is to develop a customized implementation in the curriculum to improve CT skills among students. To accomplish this, it is necessary to investigate what the current level of CT is. This will be measured by questionnaires. The final outcome of this research will be a user manual of the implementation. With this user manual, DUAS and RSU are able to integrate the implementation in the curriculum of (Applied) Psychology to improve the level of CT among their students. This present research is part of a larger project. Due to time issues, the effect of the intervention will be measured in a next phase of the project. This will be done in a follow-up study next year. Another goal of this present research is to investigate cultural differences in CT. One of the focal points of DUAS is to do international research to solve local problems and to learn from other cultures. The observed lack of CT is one of the local problems that both DUAS and RSU are trying to solve. Learning about culture and learning to solve the issue of CT deficiency is done in this research by comparing the level of CT of Russian students with Dutch students. In paragraph 2.2, the influence of cultural factors on CT is outlined.

1.4 Onset

In chapter 2, relevant literature is presented and underlying connections are illustrated. Also, hypotheses concerning the sub research questions are elaborated. In chapter 3, the research method is addressed. Following, in chapter 4 the results are presented. In the last chapter, conclusions are drawn and the results are discussed. From this, recommendations are described. The recommendations describe the proposal of an intervention, which RSU and DUAS could embed in their curriculum for (Applied) Psychology.

2. Theoretical Framework

In this chapter relevant literature is addressed. Paragraphs 1 to 3 provide literature concerning the definition of CT, the influence of culture on CT, and the relationship between lecturers and CT. In the fourth paragraph the conditions for an intervention are discussed. Further, the conceptual model and the initial expectations for the results of this current research are elaborated in this chapter.

2.1 What is Critical Thinking?

In this paragraph, the definition of critical thinking is stated. Subsequently, it is explained how CT can be measured.

2.1.1 Definition of Critical Thinking

There is a variety of definitions of CT, but as mentioned before, experts agree that skills and dispositions related to reasoning are involved (Bensley & Murtagh, 2012). In 1941, Glaser was one of the first who set a definition. He described CT as '(1) an attitude of being disposed to consider the problems and subjects that come within the range of one's experience in a thoughtful way, (2) knowledge of the methods of logical enquiry and reasoning, and (3) some skill in applying those methods.' (Glaser, as cited in The Critical Thinking Foundation, 2013). Paul and Elder (2008) define CT as self-directed, self-disciplined, self-monitored and self-corrective thinking. CT entails effective communication and the ability to solve problems and a commitment to overcome the native ego- and sociocentrism. Egocentrism is putting your view in the center of your assumptions, and believing this to be the truth. Sociocentrism, means for instance putting your culture above others and blindly following this culture, and not attempting to understand other cultures (Paul & Elder, 2008). Halpern described CT as: "the use of those cognitive skills or strategies that increase the probability of a desirable outcome. It is used to describe thinking that is purposeful, reasoned, and goal directed" (Halpern, 2002, p. 6-7).

In 1990, The Delphi Committee, a group of experts on the subject of CT, like Ennis, Paul and Facione came to a consensus for the definition of CT (Abrami et al., 2008). They described CT to be: "being purposeful, making self-regulatory judgements, which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgement is based." (Facione, 1990, p. 3). CT consist of two dimensions, namely six cognitive skills and nineteen affective dispositions. The cognitive skills of CT are interpretation, analysis, evaluation, inference, explanation and self-regulation. The Delphi Committee (1990) divides the affective dispositions in general dispositions and dispositions for approaching problems. Examples of general affective dispositions are being inquisitive, honest, analytical, truth seeking, open-minded and flexible. When approaching problems, a critical thinker should have the following dispositions: clarity, orderliness, diligence, reasonableness, care and precision (Facione, 1990). Because this definition is widespread and includes multiple aspects, this definition of CT will be used in this research.

2.1.2 Measuring Critical Thinking

There are diverse psychometric instruments to measure CT. In most studies CT is measured among students. The Watson-Glaser Critical Thinking Appraisal (WGCTA; Watson & Glaser, 1980, as cited in Bernard et al., 2008) is the oldest CT questionnaire. It is widely used and it is the most studied CT measurement. Another questionnaire to measure CT is the Hirayama and Kusumi's Critical Thinking

Schale (CT-HK; Hirayama & Kusumi, 2004). This measurement has a cultural aspect in it, hence the CT-HK will be used in this research. Chapter 3 provides a more detailed insight of the CT-HK. Besides questionnaires, CT is also qualitatively measurable. For instance, Helsdingen, Van den Bosch, Van Gog and Merriënboer (2010) measured CT by observing particular behavior.

2.2 Culture and Critical Thinking

Problem solving varies from culture to culture. Cultural backgrounds have an influence on the cognitive style: the way people approach and handle problem solving (Nisbett, 2003). Research shows that there is a difference in thinking between Westerners and East Asians. Westerners tend to think more analytical and focus on the subject independently from the context in which it is embedded. East Asians tend to have holistical thoughts and consider the relationship between the subject and its context (Jen & Lien, 2010; Nisbett & Miyamoto, 2005). Knowing this, some authors argue that some cultural groups have more difficulties with CT than others (Lun, Fischer, & Ward, 2010; Atkinson, 1997). Lun (2010) found that New Zealand students performed better on CT skills than their Asian counterparts. These skills were inference, recognition of assumptions, deduction, interpretation and evaluation of an argument. Furthermore, in the perspective of British university teachers', international, non-Western students show less critical thinking skills, such as expressing critical reflections and using logical argumentation (Shaheen, 2016).

Characteristics such as a low level of individualism, large power distance and a high uncertainty avoidance are typical for East Asian cultures (Nunez, Nunez Mahdi, & Popma, 2015; Manalo, Kusumi, Koyasu, Michita, & Tanaka, 2013). The high power distances causes students not to criticize their lecturers and they will not speak spontaneously (Fell & Luvianova, 2015). For example, Kazakhstan, a former member of the Soviet Union, has to face a lot of challenges to successfully implement CT in the school system. The Soviet educational system was built on fear-based behaviour, and was built to only to memorize, copy and imitate knowledge, which seems to be antithetical to the key point of CT (Burkhalter & Shegebayev, 2012). Russia may face the same difficulties, being a former member of the Soviet Union. In cultures with a low power distance, such as the Netherlands, students are able to express their opinion and questioning and contradicting lecturers (Fell & Luvianova, 2015; The Hofstede Centre, 2016a). Questioning authority, examining ideas with scepticism, logic and creativity are components of CT (Facione, 1990; Burkhalter & Shegebayev, 2012). So the students should have the permission of their lecturers to do this, in order to learn to think critically.

On the other hand, using cognitive expression and explicit reasoning are not acceptable in some cultures (Durkin, 2008). Maintaining harmony and avoiding confrontation is more important than critical thinking (Hofstede & Bond, as cited in Durkin, 2008). This doesn't mean that these cultures are incapable of CT, but that they prefer other thinking patterns (Hampden-Turner & Trompenaars, as cited in Durkin, 2008). Moreover, in a research between Canadian and Japanese teachers, it was found that there are cultural differences in defining CT. Canadian teachers relate CT to cognitive skills such as rational thinking and evaluating. Japanese lecturers associate CT with affective components of CT, for example being consistent, objective and fair (Howe, 2004). In this research, cognitive skills and affective dispositions of CT are investigated.

2.3 Lecturers and Critical Thinking

Not only students are lacking in CT, but lecturers in higher education as well (Stedman & Adams, 2012). Lecturers don't have a clear understanding of what CT is (Choy & Cheah, 2009; Alazzi, 2008). However, they are convinced that they are teaching CT. Though as research showed, the actual time spent teaching CT by these lecturers was minimal (Alazzi, 2008). Choy and Cheah (2009) suggest that if lecturers don't know what CT is, they are incapable to determine their student's level of CT and they are unable teaching it to students. This has to be taken in consideration when interpreting the results of the sub questions. Besides, lecturers seem to experience a conflict between wanting to stimulate CT among the students and the pressure to complete the stipulated requirements of the course (Baildon & Sim, 2009). Also, teachers can be skeptical towards teaching CT, because it shifts the class away from the course content (Bean, 2011).

2.4 Conditions for an Implementation

Developing a perfectly suitable intervention, will lead to a larger improvement (Kok, et al., 2012). In this paragraph, the intervention prerequisites are described.

2.4.1 Lecturers and the educational environment

Lecturers have to be good critical thinkers themselves, before teaching CT to their students (Black, 2005). Thus, prior to teaching CT in class, it is important to prepare lecturers for teaching CT. This ensures they understand the principles of CT, which is needed in order to teach it correctly (Choy & Cheah, 2009). Preparing lecturers requires preparation and effort. The curriculum has to be revised for CT to be included as a core value and used in a wide variety of contexts. Once established, the educational system has to be evaluated regularly, so the implementations will not slack off (Flores et al., 2012; Halpern, 2002).

According to Halpern (2002), a systematic educational effort is needed to bring forth the positive effects of CT. This can be done by giving instructions and ensuring a learning experience for the students. Not only the educational system has to change, the attitude towards students has to be correct as well (Paul, Binker, Martin, & Adamson, 1989; Kember, 1997; Pithers & Soden, 2000). Some argue that classes are built teacher centered: lecturers are engaged while students are listening passively (Paul, et al., 1989, Kember, 1997). Lecturers only give information but are not asking questions to their students. This is in contradict to CT, so a teacher-centered class has to be avoided. To establish a student centered class, students have to explore and research topics. Instead of answering questions, the lecturer has to stimulate students to ask questions (Paul, et al., 1989), and he needs to be open to the opinion of the student (Burkhalter & Shegebayev, 2012). This student centered class can be accomplished in an active learning environment (Jones, 2007). An active learning environment is a condition for teaching CT (Crawford, Saul, Mathews, & Makinster, 2005). Such an environment can be effectuated in three phases. At first, there is the anticipation phase, in which the students are directed to the topic they are about to study. In the second phase, the building knowledge phase, the lecturer challenges the students to inquire, find out and make sense of the material, answer their questions and form new ones. At last, during the consolidation phase, the students have to reflect on what they have learned, put it in perspective, and consider how they can use it (Crawford et al., 2005). During the development of the intervention, these preconditions should be taken into consideration, in order to develop a proper intervention.

2.4.2 Teaching Critical Thinking

CT should be taught explicitly (Paul & Elder, 2008). Halpern (2002) has set up a model of teaching CT, which consists of the following four parts: “(1) explicitly learn the skills of CT, (2) develop the disposition for effortful thinking and learning, (3) direct learning activities in ways that increase the probability of trans contextual transfer and (4) making metacognitive monitoring explicit and overt”. (Halpern, 2002, p. 14). To ensure the quality of thinking, intellectual standards were created (Paul & Elder, 2008). Thinking and reasoning should contain the following elements: clarity, accuracy, precision, relevance, depth, breadth, logic and fairness. Clarity means that questions and statements should make clear what one is trying to say. Accuracy: the statement has to be right. Precision is important, because it gives more details of what one is meaning, for example the phrase ‘He is overweight’ gives no details on how overweight someone is. A more precise phrase would be: ‘He is 20 kilos overweight’. Relevance means that thinking or asking questions has to be relevant to the subject you are discussing. Without depth, statements fail to deal with the complexity of the problem. For example: it would be improper to say ‘just stop fighting’ as an answer for a war. It’s more complex than that. Logic leads to good reasoning, with correct connections between subjects and analyzing the consequences in a way that makes sense. Fairness means looking at to a subject from other relevant viewpoints (Paul & Elder, 2008).

Asking questions is a very essential component of CT. It shows the inquisitiveness, which is one of the dispositions of CT (Browne & Keeley, 2005). Boswell (2006) argues that, in order to develop CT, the focus in class shouldn’t be on answering questions, but on the questions themselves. Answers put an end to a discussion, but to improve CT, it’s important to freely ask different kinds of questions, instead of answering them (Boswell, 2006). To come to asking critical questions, one needs to know which questions can be asked. Also the ability to ask those questions is needed. Lastly, a bold attitude is important, so these questions will not be evaded (Browne & Keeley, 2005).

As appears from aforementioned literature, there are different opinions of what CT is and what it entails. It differs per research which definition is used. Further, lecturers teach different components of CT and it varies from culture to culture which components of CT students use. In this research, the definition of the Delphi Committee is used (Facione, 1990), and this research is an endeavor to enhance those components.

2.5 Conceptual Model

Figure 1 shows the conceptual model of this current research. This conceptual model is a visualisation of the literature as described in paragraph 1.1 and chapter 2. As illustrated, CT consists of multiple dispositions and skills. Instructions and cultural factors influence CT. Thinking critically leads to making better decisions, filtering information quickly, a deeper understanding of a subject, the ability to handle complex problems, becoming aware of influences and higher grades among students.

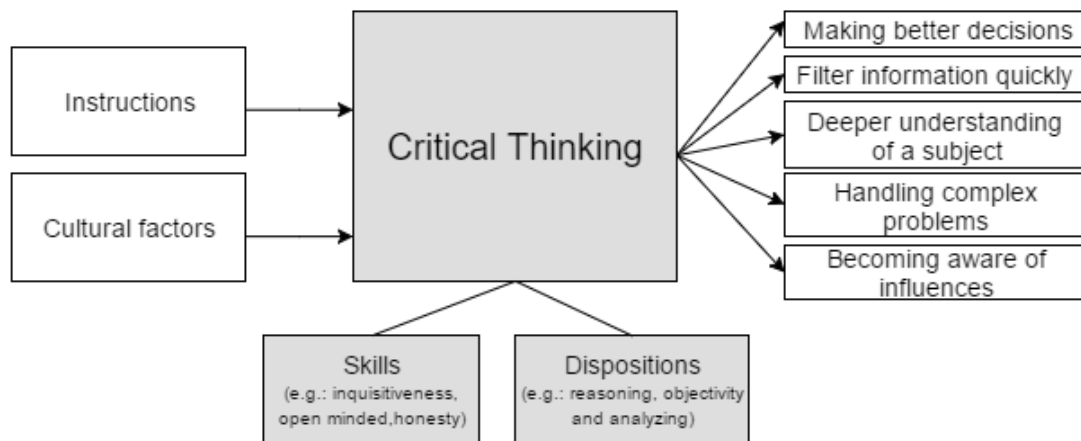


Figure 2.1: Conceptual model.

2.6 Hypotheses

Based on the aforementioned literature, hypotheses on the sub research questions (as described in paragraph 1.2) are composed.

- Hypothesis for sub question 1: There will be a difference in CT between Russian and Dutch students. On the component of reasoning and the use of logic, students of RSU will score higher, because RSU provides a course in which this is taught. On the other skills and dispositions, it is expected that the Dutch students will score higher, in accordance with the literature (Lun, 2010; Lun et al., 2010; Atkinson, 1997).

- Hypothesis for sub question 2: According to the lecturers, the level of CT among DUAS students is low to average.

It is unknown if the lecturers are familiar with the concept CT. Being aware of the definition of CT is a precondition for estimating the level of students. If they are able to estimate the students' level of CT, it won't be high, because students did not receive explicit instructions of CT.

- Hypothesis for sub question 3: It is expected is that the level of CT determined by the students of DUAS will not differ from the level of CT determined by their lecturers.

Based on found literature, there are no grounds to assume that there will be a difference.

- Hypothesis for sub question 4: For DUAS students, all components (skills and dispositions) have to be enhanced. This is expected, because students did not receive instructions on CT yet, so it is assumed that there is a low to average level of CT among the DUAS students. For RSU students, the component of reasoning and the use of logic will need less of an improvement, since the RSU already has a course Argumentation in which this is taught. The other components of CT need improvement as well.

3. Research Design

In this chapter, the design of the research is addressed. In the first paragraph, the participants of the research are introduced. In the second paragraph, the research instrument is pointed out. In paragraph 3 the method of the research and the procedure are elaborated. The analyses which were done, are described in the last paragraph.

3.1 Method

The used method is survey research, this a quantitative form of research. A survey research is an excellent method to research to what extent respondents show particular behavior (Korzilius, 2000), which is done in this research. CT will be measured with a self-assessment questionnaire, the CT-HK. Students were approached during classes, so this research is a selective cluster sample (Verhoeven, 2011). It ensures a high amount of respondents (Verhoeven, 2011). Using a cluster sample is the most economical form of sampling. It is easy and it costs less time to approach a group of respondents (Ahmed, 2009). In this research, an error margin of 5 and a confidence interval of 95% is applied. Lecturers were approached by e-mail, so they decided themselves whether or not to participate. This is a form of self-selective response (Verhoeven, 2011).

3.2 Participants

The population of this research exists of bachelor students of Applied Psychology at DUAS (N = 210) and Psychology at RSU (N = 130). To come to a valid and generalizable outcome of this research, a sample size of at least 136 students is needed at DUAS. Therefore, 150 students were approached. At RSU, at least 97 students should fill in the questionnaire to come to a generalizable outcome. Students who did not agree to cooperate with this research were excluded. Also students who did not attend the course during the spreading of the survey, were excluded and were not approached at a later moment. The respondents are all in the second year of their study and are all studying full-time. The estimated range in age is between 17 and 30. All students of DUAS have obtained enough European Credit Transfer System points (ETCS) in the first academic year, so that they were allowed to pass to the second year.

Lecturers of DUAS were approached to give their opinion of CT skills of their Applied Psychology students. Doing this puts the level of CT of the students of DUAS in perspective. The approached lecturers (N = 39) all provide one or more courses in the second year of Applied Psychology at DUAS. In this population of 39 lecturers, 26 of them were female, the others were male.

3.3 Research Instruments

To measure the level of CT, the CT-HK is used (Hirayama & Kusumi, 2004). The CT-HK contains items that reflect “Asian cultural perspectives about CT, while at the same time not deviating from generally accepted notions of what CT use in academic environments entails” (Manolo, et al., 2013, p. 125). This makes the CT-HK a suitable instrument to use in this research, since the respondents have an Asian or Western cultural background. Also, the CT-HK reflects the definition of CT of the Delphi Committee (Facione, 1990), which was used in this research, because the CT-HK measures skills and dispositions of CT. It measures four components of CT: the use of logical or systematic

approach, to what extent one is inquisitive, in to what extent one is objective and to what extent one relies on evidence. Corresponding subscales are: Logical Attitude, Inquisitiveness, Objectivity and Evidence Seeking. Last year's research among the same population found the Cronbach's alpha to be good ($\alpha = 0.73$; Vreede, 2015; De Boer, 2015). Also, Manalo et al. (2013) found the Cronbach's alpha to be good ($\alpha = 0.71$). This was found in a comparison between Asian and Western students (Manolo et al., 2013). Although the reliability seems to be good, information about the validity of the CT-HK is unknown. The CT-HK consists of 18 items with a 5 point Likert scale (1 = disagree, 2 = mildly disagree, 3 = neutral, 4 = mildly agree, 5 = agree). The CT-HK is an open-source measurement and it is originally written in English, but has been professionally translated into Dutch and Russian. The Dutch version of the CT-HK is included in Appendix A. In Appendix B, a table of the items and corresponding subscales is presented. These items were formulated in English. Lecturers of the DUAS students were asked to fill in the CT-HK as well. In this questionnaire the words 'I' and 'me' were replaced by 'the student', to make the questions suitable for the lecturers. Reliability analysis of this 'Lecturer version of the CT-HK' was not done before.

3.4 Procedure

The questionnaire (the Dutch version in Appendix A) was handed out to DUAS Applied Psychology students and to Psychology students at RSU, during classes. Aside from answering the specific questions regarding CT in the CT-HK, the students were asked to fill in the following demographic details: student number, age, gender, nationality and the amount of earned ETCS's in the first year. Before filling it in, students were given a verbal explanation of the questionnaire. The CT-HK itself and the purpose of the research were introduced to the students.

At RSU the questionnaire was filled in by paper and pencil. Data collection at RSU was ensured by one of the professors. After the questionnaires were filled in by the students from RSU, the data was exchanged to DUAS and vice versa. Data collection at DUAS went differently, these students have filled in the questionnaire digitally. Firstly, the lecturers of the course 'Applied Research' were asked for permission to distribute the survey during their class. They all gave their permission. The students were approached during the course 'Applied Research', since this course is given in a room where computers were already available. To ensure sufficient tools for filling in the questionnaire, there were extra iPads available for the students. Qualtrics is an online software tool for spreading surveys and was used in this research. The advantage of using digital tools is that data could be easily and without errors collected and processed. After a short introduction, the students opened their e-mail to be redirected to the questionnaire. Students were asked to fill in the survey immediately. Filling in the questionnaire took about 15 minutes. Questions of students about the CT-HK were answered by the researcher.

The lecturer version of the CT-HK was sent to the lecturers by e-mail, with a description of the research included. Response rates of surveys sent by e-mail varies from 21% to 52,7% (Shih & Fan, 2009; Baruch & Holtom, 2008; Kaplowitz, Hadlock, & Levine, 2004). Due to this variance, the expected response rate of this research is unknown. Lecturers who did not fill in the questionnaire within two weeks, have received a reminder, because this increases the response rate (Kaplowitz et al., 2004). Beside the CT-HK, the lecturers were asked to note their gender, which course(s) they

teach in the second year and how long they have been working as a lecturer at Applied Psychology at DUAS.

3.5 Analyses

Results of the survey among the students are processed in IBM SPSS Statistics (version 22). Firstly, demographic information was calculated with frequency analysis. Subsequently, Cronbach's alpha's of the CT-HK and the lecturer version of the CT-HK were calculated, to examine the reliability. The first sub research question examines if the level of CT of the Dutch students differs from the students in Russia. In order to investigate this, the t-test was used. This was done for the complete CT-HK, as well for the subscales. Also, the level of CT of the students of RSU and DUAS are compared to the reference group of Manolo et al. (2013). In this research, Asian students (from Okinawa and Kyoto, Japan) and Western students (from Auckland, New Zealand) were compared. The mean scores of students from Okinawa (n = 103) and Kyoto (n = 173) will be compared to the students of RSU, because of the Asian backgrounds. The students of DUAS are compared to the respondents from Auckland (n = 87), because New Zealand and the Netherlands are both Western countries. These analyses were done by a t-test. Details of the mean scores found by Manolo et al. (2013) are presented in Table 3.1.

The second sub research question investigates what the level of CT among the DUAS students is, according to their lecturers. This is done by frequency tests, for the complete CT-HK and the subscales. The third sub research question examines the difference in the level of CT, determined by the students of DUAS and their lecturers. This is investigated with a t-test. When the sample size of the lecturers is too small to satisfy the conditions for a t-test, a Mann-Whitney U-test is performed. The complete CT-HK and its subscales were compared to investigate significant differences. The last sub question is a composition of the former sub questions. To answer this, frequency tests were done to investigate if students scored low, average, or high for each subscale. Based on this, and the former sub questions, statements for this sub question were made. All calculations were on the mean scores, therefore all scores are between 1 and 5. In order to interpret these scores, the following norms are applied. A score $\leq 2,5$ was interpreted as low. Scores between 2,6 and 3,5 were defined as average. All scores $\geq 3,6$ were interpreted as high (M. Farfan, personal communication, June 3, 2016). For example, if the mean score was 4,3, this means that the students' level of CT was high.

Table 3.1

Differences in scores (means and standard deviation) at the CT-HK, per location, found by Manalo et al. (2013).

Measure	Location		
	Kyoto (n = 173)	Okinawa (n = 103)	Auckland (n = 87)
M	3,59	3,66	3,91
SD	0,48	0,47	0,53

Note. Reprinted from "To what extent do culture-related factors influence university students' critical thinking use?" by E. Manalo, T. Kusumi, M. Koyasu, Y. Michita & Y. Tanaka, *Thinking Skills and Creativity*, 10, p. 126. Copyright 2013 by Elsevier.

4. Results

In this chapter, the results are addressed. Paragraph 1 provides insight into the response of this research. The second paragraph describes the reliability of the used instruments. Lastly, in paragraph 3 the research questions are answered based on the analysis. Throughout this chapter, tables and figures clarify the results.

4.1 Procedure and Response

The research procedure went as described in chapter 3. At RSU, the students filled in the questionnaire in week 22 of 2016. Students of DUAS were approached during classes between the 25th and 29th of April. Lecturers received an e-mail with a hyperlink to the questionnaire on May, 9. A reminder was sent on the 19th of May. On May 30th, the questionnaire was closed. RSU students did not fill in their nationality and ETCS earned, because there are no foreign students at RSU and RSU does not use the ETCS system. Item 5 and 13 of the CT-HK were recoded, because these items were formulated negatively.

Table 4.1 shows the response of this research. At DUAS, 86 of the 210 students (41,0%) of the population, have filled in the CT-HK. The response rate among the lecturers of DUAS was 35,9%, 14 of the approached 39 lecturers filled in the questionnaire. At RSU, 38 of the 130 students (29,2%) have filled in the questionnaire. The lecturers of DUAS were not asked to fill in their age. So at Table 4.1, the mean age of the row 'total' is the mean age of RSU students and DUAS students combined. In total, 138 respondents have filled in the questionnaire, 124 of them were students, the others were lecturers of DUAS. One lecturer did not fill in his/her gender. At DUAS, 82 respondents had the Dutch nationality, the other students were Dutch/Turkish (1), Portuguese (1), Molluccan (1) and German (1). The RSU and DUAS students were compared to investigate the differences between gender and age. As Table 4.1 shows, the mean age of the Dutch students was significantly higher than the mean age of the Russian students ($t = 3,08$, $df = 121,88$, $p = 0,00$). Table 4.1 shows the means scores for both groups.

Table 4.1

Demographic information of the respondents.

	N	Gender		SD	Age	
		Male	Female		Mean	SD
RSU students	38	6 (15,8%)	32 (84,2%)	0,37	19,58	0,95
DUAS students	86	27 (31%)	59 (68,6%)	0,47	20,42	2,09
Lecturers DUAS	14	5 (35,7%)	8 (57,1%)	0,48	-	-
Total	138	38 (27,5%)	99 (71,7%)	0,45	20,10	1,85

4.2 Reliability Analysis

Firstly, a reliability analysis of the entire CT-HK was done. The group of the RSU and DUAS students showed a Cronbach's Alpha for the complete CT-HK which is considered as acceptable ($\alpha = 0,69$). A reliability analysis was also done for the subscales of the CT-HK. The results are presented in Table 4.2. To come to these reliability values, some items had to be removed, because without removing items, the Cronbach's alpha would be even lower. For the subscale Logical Attitude, item 5 is removed, which means this factor now consists of four items. The Cronbach's alpha of the subscale

Inquisitiveness was good ($\alpha = 0,76$) and no items were removed. Item 15 was removed from the subscale Objectiveness. For the subscale Evidence Seeking, item 17 was deleted. This subscale now consists of only two items. As shown in Table 4.2, multiple subscales did have a poor Cronbach's Alpha. Because of the poor reliability values, a factor analysis was done. Only the scale Inquisitiveness consisted of one factor, the other subscales consisted of multiple factors. These new factors all showed low reliability values as well, hence further calculations were done with the original subscales of the CT-HK, despite the low reliability values. This also makes further comparisons easier. The removed items are no longer included in further calculations with these subscales, but they still are included in the CT-HK Total.

Table 4.2

Reliability Analysis of the CT-HK (student version)

Subscale	N of items	Cronbach's alpha (α)	Internal Consistency
Logical Attitude	4	0,40	Poor
Inquisitiveness	5	0,76	Good
Objectiveness	4	0,35	Poor
Evidence Seeking	2	0,59	Acceptable
Total CT-HK	18	0,69	Acceptable

Secondly, a reliability analysis of the lecturer version of the CT-HK was done. This questionnaire is considered as reliable. The Cronbach's Alpha of the entire CT-HK ($\alpha = 0,89$) is good. This was calculated with all items. The subscale Logical Attitude has a Cronbach's Alpha of 0,74. Item 5 was removed. The subscale Inquisitiveness has a Cronbach's Alpha of 0,72. The Cronbach's Alpha of the subscale Objectiveness is also 0,72. To come to this value, item 15 had to be removed. Also, the subscale Evidence Seeking has one removed item (item 17), which means, this subscale now consists of only two items. Nevertheless, the reliability of this subscale is considered as good ($\alpha = 0,70$). The removed items are no longer included in further calculations with this subscales, but they still are included in the CT-HK Total. The removed items from the lecturer version of the CT-HK are the same items that have been removed from the CT-HK of the students.

4.3 Results Data analyses

In this paragraph, results of the data analyses are described per sub question.

4.3.1. Sub question 1: To what extent differs the current level of Critical Thinking among bachelor Applied Psychology students at the Dutch University of Applied Sciences, from the bachelor Psychology students at the Russian State University?

Results of the analyses done for this sub question are shown in Table 4.3. On the entire CT-HK, there was no significant difference. A significant difference was found at the subscale Inquisitiveness ($t = -2,51$; $df = 97,94$, $p = 0,01$). On average, the Russian students ($M = 4,48$; $SD = 0,49$) are more inquisitive than the Dutch students ($M = 4,20$; $SD = 0,69$). On the subscale Evidence Seeking, the RSU students ($M = 4,08$; $SD = 0,61$) also scored significantly higher ($t = -2,37$, $df = 95,30$, $p = 0,02$) than the students of DUAS ($M = 3,76$; $SD = 0,84$). No differences were found for the other subscales. In summary, significant differences between the groups were found on the subscale Inquisitiveness and Evidence Seeking. In both cases the RSU students scored higher.

Table 4.3

Results of analysis in difference between the RSU students and DUAS students on their level of CT, calculated with a t-test.

Subscale	Mean (SD) DUAS students (n = 86)	Mean (SD) RSU students (n = 38)	Results t-test		
			t-value	df	p-value
Logical Attitude	4,07 (0,56)	3,96 (0,53)	1,10	122	0,27
Inquisitiveness	4,20 (0,69)	4,48 (0,49)	-2,51	97,94	0,01
Objectiveness	3,84 (0,61)	3,67 (0,49)	1,53	122	0,13
Evidence Seeking	3,76 (0,84)	4,08 (0,61)	-2,37	95,30	0,02
Total CT-HK	3,92 (0,44)	3,94 (0,28)	-0,37	106,56	0,71

Note. Significant difference when $p < 0,05$.

The results of this research were compared to the reference group of Manolo et al. (2013). The students of RSU ($M = 3,91$ $SD = 0,44$) scored significantly higher than the students from Kyoto ($M = 3,59$; $SD = 0,48$; $t = 6,83$; $df = 85$; $p = 0,00$). The mean score of RSU was also significantly higher than the mean score ($M = 3,66$; $SD = 0,47$) of the students from Okinawa ($t = 5,36$; $df = 85$; $p = 0,00$). The mean score ($3,91$; $SD = 0,44$) of the students from DUAS was compared to the respondents from Auckland ($M = 3,91$; $SD = 0,53$). There was no significant difference ($t = 0,11$; $df = 85$, $p = 0,91$).

4.3.2. Sub question 2: To what extent are the students of bachelor Applied Psychology at the Dutch University of Applied Sciences thinking critically, according to their lecturers?

To answer this sub question, the scores of the subscales and the total score were investigated. Table 4.4 and Figure 4.3 provide more insight in the response of the lecturers. The total level of the students' CT skills is average ($M = 3,02$; $SD = 0,59$), according to their lecturers. The minimum score was 1,67 and maximum score was 3,94. Slightly more than one-fifth (21,4%) of the lecturers indicate the level of CT among their students as high, while 14,3% marked it as low. The rest of the respondents (64,3%) rated it as average. Hence, according to the lecturers of DUAS, the students are thinking critically at an average level. The male lecturers estimated their students' level of CT at 3,44 (mean rank = 10,10), while their female counterparts scored it at 2,74 (mean rank = 5,06). This difference is significant ($Z = -2,27$; $p = 0,02$), found with a Mann-Whitney U-test, meaning the male lecturers estimated the level of CT among their students to be higher.

Table 4.4 shows the mean scores for each subscale and Figure 4.3 shows the distribution among each subscale. The mean score for the subscale Logical Attitude is 3,03 ($SD = 0,76$). Male lecturers ($M = 3,56$; mean rank = 10,20) estimated the logical attitude of their students significantly higher than their female counterparts ($M = 2,63$; mean rank = 5,00; $Z = -2,36$; $p = 0,02$). The mean score on the subscale Inquisitiveness was 3,20 ($SD = 0,66$). Only one respondent indicated this subscale as low. Almost half of the respondents (42,9%) found the degree of Objectiveness among their students to be low. Two of the fourteen lecturers marked this scale as high. A significant difference between gender was found ($Z = -2,08$; $p = 0,04$), done with a Mann-Whitney U-test. Males ($M = 3,45$; mean rank: 9,80) indicated this scale higher than females ($M = 2,53$; mean rank: 5,25). Evidence Seeking is rated 3,1 ($SD = 0,76$) on average.

Table 4.4

Mean, standard deviation, minimum and maximum scores of the lecturer version of the CT-HK.

Subscale	Mean	SD	Minimum	Maximum
Logical Attitude	3,02	0,74	1,60	4,20
Inquisitiveness	3,20	0,66	1,80	4,40
Objectiveness	2,86	0,74	1,25	4,00
Evidence Seeking	3,11	0,76	1,50	4,00
Total CT-HK	3,02	0,59	1,67	3,94

4.4.3. Sub question 3: To what extent does the students' level of Critical Thinking, as determined by the students in bachelor Applied Psychology of the Dutch University of Applied Sciences, correspond to their level of CT as determined by their lecturers?

Due to the small sample size of the lecturers ($n = 14$), a Mann-Whitney U-test instead of a t-test was used to answer this sub question. In Table 4.5, the results of this analyses are elaborated. As shown, on all subscales and on the complete CT-HK, significant differences were found. Lecturers of DUAS determined the level of CT among students significantly lower than the students of DUAS themselves. In the questionnaire, lecturers have filled in which course they teach in the second year. It was investigated if, according to the course lecturers, the level of CT among the DUAS students differs from course to course. However, no significant differences were found.

Table 4.5

Results of analysis of differences between DUAS students and their lecturers, done with a Mann-Whitney U-test.

Scale	Mean DUAS students (n = 86)	Mean lecturers (n = 14)	Results Mann-Whitney U test			
			Mean rank students	Mean rank lecturers	Z-value	p-value
Logical Attitude	4,07	3,02	54,55	22,36	-3,92	0,00
Inquisitiveness	4,20	3,20	55,05	19,32	-4,33	0,00
Objectiveness	3,84	2,86	52,43	35,25	-2,11	0,04
Evidence Seeking	3,76	3,11	53,05	31,50	-2,65	0,01
CT-HK total	3,92	3,02	55,60	15,89	-4,80	0,00

Note. Significant difference when $p < 0,05$.

4.3.4. Which components of Critical Thinking should be enhanced at the Dutch University of Applied Sciences and the Russian State University, in accordance with the findings on the former sub questions?

RSU students

Figure 4.1 shows, per sub scale, how RSU students assessed themselves (low, average or high). The values are shown in percentages. Table 4.3 shows the mean scores. In general, RSU students think they're thinking very critically, because 92,1% estimated it as high. Overall, none of the RSU respondents thinks his/her level of CT is low. The mean score for all sub scales was high, and as apparent from Figure 4.1, the majority estimated their level for each subscale as high. For example no less than 94,7% believes he/she is very inquisitive and no one from RSU thought her/his level of

inquisitiveness was low. Further, two students estimated themselves as excellent Evidence Seekers, with the maximum score of 5 for this subscale. As illustrated in Figure 1, the scale Objectiveness is scored lowest. The mean score on this subscale was 3,67. The majority (55,3%) scored the subscale as high, though, a substantial part marked it as average (42,1%). Only 2,6%, which is one respondent, believed he/she had a low level of objectiveness. Although the mean scores of this subscale is marked as high, this could be enhanced. RSU students thought they possessed a logical attitude, were being very inquisitive and were seeking evidence. Though these subscales were not scored at maximum score, so they still could be improved.

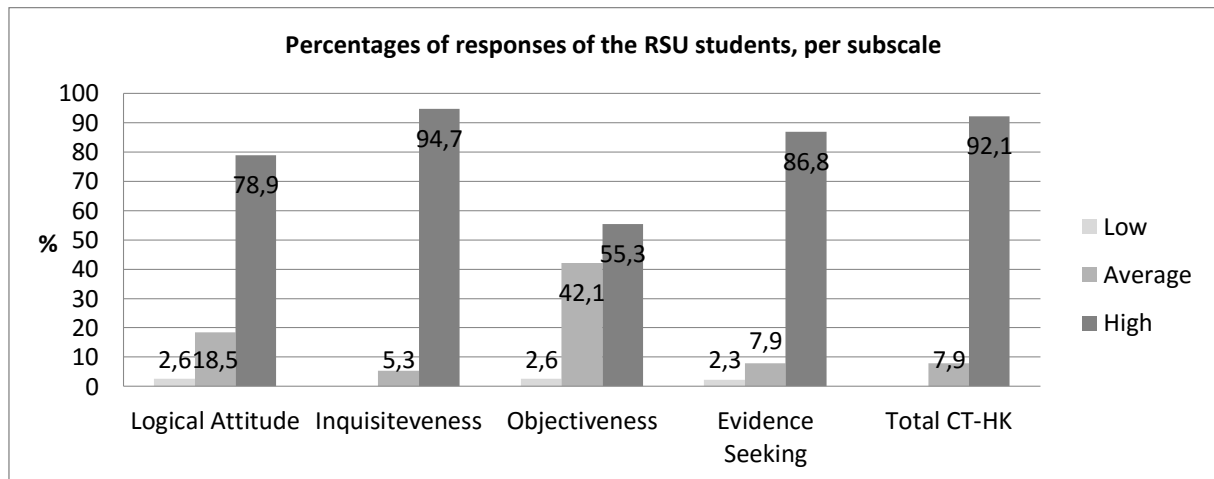


Figure 4.1. Percentages of responses of the RSU students per subscale, illustrated by a bar graph.

DUAS students

In general, the students of DUAS thought they were thinking critically, because more than 4 out of 5 students (82,6%) estimated their level of CT as high. 16,2% found their level of CT on an average level and only one respondent scored low on the complete CT-HK. Looking at the subscales, the majority of the respondents scored 'high', for every construct, as Figure 4.2 shows. For example, students thought they possessed a logical attitude and are being inquisitive. The subscales Objectiveness and Evidence Seeking are scored lowest by the DUAS students. The mean score of the subscale Objectiveness was 3,57. Although 64% of the DUAS students estimated their degree of Objectiveness as high, a substantial part estimated it as low or average. The subscale Evidence Seeking had a mean score of 3,75. For the subscale Evidence Seeking, slightly less than two-third estimated it as high, but a substantial part thought this skill could be improved. According to the students themselves, these two subscales need the most improvement.

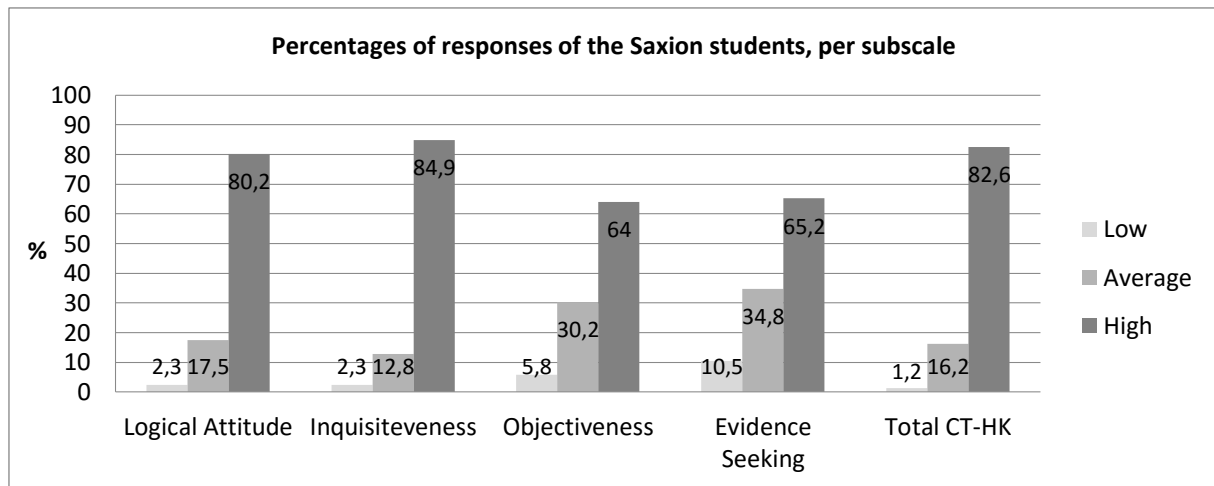


Figure 4.2. Percentages of responses of the DUAS students per subscale, illustrated by a bar graph.

As shown by the results of paragraph 4.4.3, the lecturers of the DUAS students estimated the level of CT among their students significantly lower than the students did themselves. According to them, all components of CT could use improvement. All subscales were scored at an average level by the lecturers. As illustrated in Figure 4.3, the subscales Objectiveness and Evidence Seeking were scored the lowest. 42,9% of the lecturers thought the level of objectiveness was low, and also 42,9% thought it was average. The level of Evidence Seeking among students was scored as low by 28,6% of the lecturers. It was scored as average for exactly half of the respondents. For the subscales Logical Attitude and Inquisitiveness, the majority of the lecturers thought it was on an average level. In summary, according to the lecturers of DUAS, all subscales could be enhanced, especially Objectiveness and Evidence Seeking. The students also thought their level of objectivity an evidence seeking could be improved.

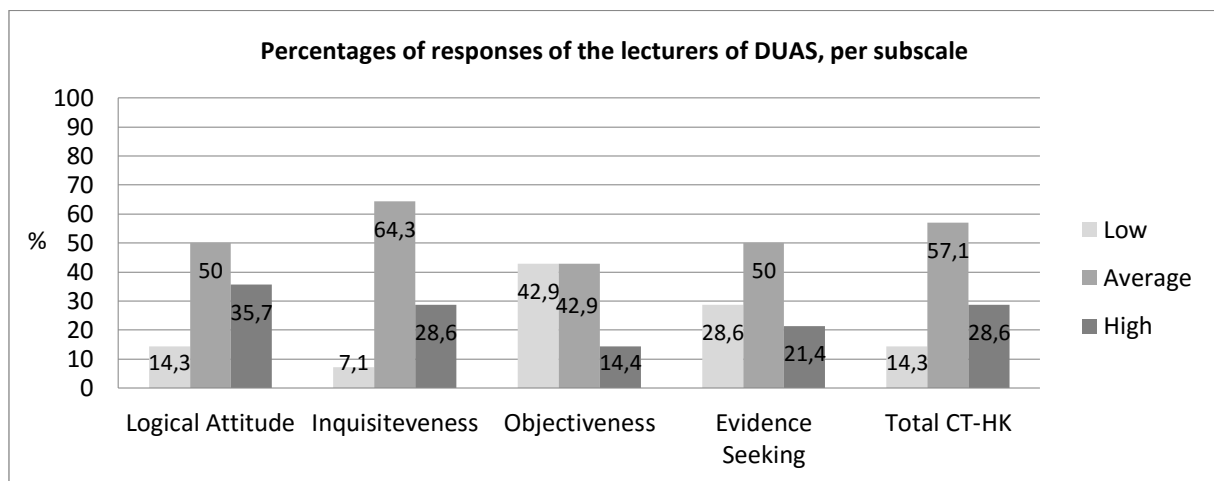


Figure 4.3. Percentages of responses of the lecturers of DUAS per subscale, illustrated by a bar graph.

5. Conclusion, Discussion and Recommendations

In this chapter the conclusion of this research is formulated and the hypotheses are accepted or dismissed. This is followed by a discussion of the results. After this, the research question of this thesis are answered. The limitations of this research are elaborated in paragraph 5.4. In paragraph 5.5 the usefulness is addressed. Recommendations on further research are done. Lastly, a proposal for the integration of CT in the curriculum of RSU and DUAS is presented in paragraph 5.7.

5.1 Conclusions

5.1.1 Sub question 1

The first sub question concerned to what extent the current level of CT among bachelor students of Applied Psychology at DUAS differs from the level of CT among bachelor Psychology students at RSU. Based on the results, it is concluded that the level of CT among the RSU and DUAS is equal, except for the level of inquisitiveness and evidence seeking. On these components the RSU students scored higher. These results partially confirm and partially conflict with the hypothesis. The only differences were found in the subscales Inquisitiveness and Evidence Seeking and not for the complete CT-HK, which was the hypothesis. Given the previous findings, it was expected that the students of DUAS would score higher on these subscales. However, this was in contrast to the results of this research. Furthermore, it was expected that on the subscale Logical Attitude, the Russian students scored higher, given that they had followed a course in these skills. However, students at RSU do not thinking more logical than their Dutch counterparts, which is remarkable. All in all, the hypothesis for sub question 1 is rejected.

The results were also compared to the reference group of Manolo et al. (2013). The mean score for the complete CT-HK of the DUAS students did not differ in comparison to the students from Auckland. Students of RSU were compared to the respondents from Kyoto and Okinawa (Manalo et al., 2013). The students of RSU scored higher.

5.1.2 Sub question 2

The second sub question researched what the current level in CT of the DUAS students was, according to their lecturers. The lecturers of DUAS estimated the level of CT of an average level, meaning their students show some components of CT, but not in an excellent way. There is room for improvement. Of all components, students showed objectivity the least and inquisitiveness the most, according to their lecturers. The hypothesis for sub question 2, that according to the lecturers of CT among DUAS students is low to average, is confirmed.

5.1.3 Sub question 3

Sub question 3 was an investigation to what extent the students' level of Critical Thinking, as determined by the of DUAS, corresponds to the level of CT determined by their lecturers. The lecturers of DUAS estimated the level of CT among their students lower than the students did themselves. The students thought they were excellent critical thinkers, but their lecturers thought they were average critical thinkers. The results of for this sub questions causes the corresponding hypothesis to be rejected. It was expected that there were no significant differences in the determination by the lecturers and students. The results showed differences for every subscale.

5.1.4 Sub question 4

The last sub question researched which components of CT should be enhanced, in accordance with the former sub questions. For RSU students, it could be said that inquisitiveness among students does not need improvement, since almost everybody thought they were very inquisitive. The other measured components of CT could use improvement, because those were not scored at a maximum. However, the focus should be on objectiveness, because at this subscales, a substantial part of the respondents said it was of an average level. The hypothesis was that at RSU, the component of reasoning and the use of logic will need less of an improvement, since the RSU already have a course Argumentation in which this is taught. The other components of CT need improvement as well. This hypothesis cannot completely be approved. Indeed, the results showed that that Logical Attitude is already high, but the students also thought their level of inquisitiveness and evidence seeking was high. This result is antithetical to the hypothesis. Concluding, all components could be enhanced among RSU students, but the focus should be on objectiveness.

According to the lecturers of DUAS, all components of CT should be embedded in the curriculum of DUAS. They estimated the students' level of CT at an average level, which means there is room for improvement. According to the students, they are already possess CT skills and dispositions, especially inquisitiveness and a logical attitude. However, they still could learn how to be more objective and how to rely of evidence better. The first hypothesis was that for DUAS students, all components have to be enhanced. This is in accordance with the estimation of the lecturers, but conflicts with the estimation of the DUAS students themselves. The question remains what one should rely on, the opinion of the students or the opinion of their lecturers. This is discussed and answered in the following paragraph.

5.2 Discussion

The Russian students have a higher level of Evidence Seeking and Inquisitiveness in comparison to the students of DUAS, which is conflicting with the found literature as described in chapter 2. An explanation of the high level of Evidence Seeking is the tendency of people of East Asian cultures to avoid uncertainty (The Hofstede Centre, 2016b). Students with a high level of uncertainty avoidance have a need for predictability and uncertainty needs to be eliminated as quickly as possible (Nunez, et al., 2015). Students may do this by seeking evidence for their opinion, argumentation and conclusions, in order to ensure it will be approved by their lecturer. It cannot be clarified by literature why the Russian students are more inquisitive than their Dutch counterparts. Besides, some authors argue that cultural factors do not influence CT at all (Paton, 2005). This could be a clarification of the equality on the other skills and dispositions among the Russian and Dutch students.

It is remarkable that students of RSU and DUAS thought they were thinking very critically, although there is no explicit attention to CT in the curriculum of RSU and DUAS. At RSU, there is the course Argumentation, but this course does not include all elements of CT. The high level of CT among students could be explained by the social desirability bias of the students. They may want to present themselves as critical thinkers, to look good. This process could happen consciously as well subconsciously (Vonk & Modde, 2009), meaning the students may not even be aware that they presented themselves better than they may were. Another clarification is a lack of self-appraisal among students. It is likely to for people to overestimate their CT skills (Cottrell, 2005). Students may

assume they use proper logic and reasoning skills, but others, such as lecturers, may not share this view (Cottrell, 2005). This could have happened at DUAS, which explains the discrepancy between the estimation of the lecturers and the students. On the other hand, the lecturers of DUAS may have underestimated the level of CT among their students. The lecturers may not be aware of what CT entails, which leads to the inability of determining the students' level of CT (Choy & Cheah, 2009).

The question remains what one should rely on, the opinion of the DUAS students or the opinion of their lecturers. Because of the remarkable and unexpected high scores of the students, there is a substantial likelihood of social desirability or over-estimation by the students (Vonk & Modde, 2009; Cottrell, 2005). It is unlikely that the level of CT is this high without any explicit lessons, because "humans are not naturally critical" (Van Gelder, 2005, p. 42). Learning to think critically is hard, thus it has to be taught and students have to practice it (Van Gelder, 2005). For this reason, it is concluded that at DUAS, all components of CT have to be integrated in the curriculum, with emphasis on objectivity and evidence seeking.

5.3 Research Question

Now the sub questions are answered and the conclusions are discussed, the research question can be answered. The research question was: *In which way can Critical Thinking be implemented in the curriculum, in order to enhance the level of Critical Thinking among bachelor Applied Psychology students of DUAS and bachelor Psychology students of the Russian State University?* It is advised to implement all components of CT in the curriculum of RSU and DUAS. At RSU the focus should be on learning to be objective. At DUAS, the focus should be on the skills evidence seeking and being objective. The students of DUAS and RSU thought they were already thinking critically, but as described in paragraph 5.2, this may not be the genuine level of CT among the students. That is why it is advised to integrate all components of CT with a focus on the components that students possess to a lesser extent. Implementing CT in the curriculum can be done by teaching what CT entails and practising skills. The components of CT should be adapted in courses in which those particular skills are important. A proposal of the implementation is described in paragraph 5.7, along with particular exercises.

5.4 Limitations of this Research

Though the response rate of the lecturers was in accordance with found literature, the response rate of the students was lower than expected. Therefore, the results of this research sample are not generalizable to the population. The results as presented in chapter 4 and the corresponding conclusion should only be applied to students who filled in the questionnaire, and not to all bachelor students of Applied Psychology at DUAS or bachelor students Psychology at RSU. More importantly, the used respondents do not in any case represent students in the rest of the Netherlands nor in Russia.

Another limitation is the low reliability for the student version of CT-HK. Hence, the results should be interpreted carefully. There are multiple explanations for the low Cronbach's Alpha. Firstly, the low reliability can be explained by the number of items of the CT-HK. For example, the subscale Evidence Seeking has only three items, which is very little. In this research one item was removed, so in this

research Evidence Seeking consisted of only two items. The homogeneity of a construct will be better, if more items were used (Baarda, De Goede, & Van Dijkum, 2011). Additionally, an instrument will be more accurate with more items (Drenth & Sijtsma, 2006). Although the Cronbach's Alpha of the lecturer version of the CT-HK was acceptable, the results should be interpreted carefully too, due to the small number of items in this questionnaire (Drenth & Sijtsma, 2006). Thereby, there were only 14 respondents who filled in the lecturer version of CT-HK, which is a small number (Drenth & Sijtsma, 2006). This makes the results unreliable. In addition, it is unknown if the lecturers were familiar with the concept of CT, although this is a precondition for determining the students' level of CT (Choy & Cheah, 2009). This makes the reliability of the results questionable. Lastly, several items of the CT-HK are ambiguous, meaning there are questions asking for two constructs (for example item 1; Appendix A and Appendix B). This may have caused misunderstandings among students. Students may have filled in that they fully agree with the statement, although they actually agree with only one concept. This decreases the reliability.

The last limitation of this research is the validity of the CT-HK. According to Manalo et al., (2013), the congruent validity is good, because there was a significant correlation found between the CT-HK and the Critical thinking scale of the Motivated Strategies for Learning Questionnaire (CT-MSLQ; Pintrich, Smith, Cargica, & McKeachie, 1991). Comparisons with the CT-HK and other critical thinking-instruments have not been done yet. It could be argued that in this research the content validity is low. Content validity is defined as to what extent a test is representative for the complete domain of a concept (Drenth & Sijtsma, 2006). CT consists of six skills and nineteen dispositions (Facione, 1990), but the CT-HK measures only four components of CT (logical attitude, inquisitiveness, objectiveness and evidence seeking). The content validity would be higher if the CT-HK measures more skills and dispositions. Further, the CT-HK has a Likert-scale with the labels 'mildly (dis)agree', '(dis)agree' and 'neutral'. This could provoke an acquiescence-set, a tendency to (excessively) agree with the items of a test (Drenth & Sijtsma, 2006). An acquiescence-set lowers the validity of an instrument (Drenth & Sijtsma, 2006). Students may have estimated themselves lower if the Likert-scale labels were 'agree' (instead of 'mildly agree') and 'strongly agree' (instead of 'agree'). In that case, the option 'disagree' should be 'strongly disagree', and 'mildly disagree' should be 'disagree'. The combination of the possible acquiescence-set and the possible tendency of the respondents to answer in a social desirable manner could explain the high level of CT among students, and it lowers the validity of this research. This could be prevented by using answer options without social desirability options (Dooley, 2009).

5.5 Usefulness of this Research

The fact that the results are not generalizable to the complete population decreases the usefulness of this research. In addition, the reliability of this research is low, as well as some aspects of the validity. Consequently, there should not be much value attached to the results of this research. Though, the implementation as presented in paragraph 5.7, could be useful to RSU and DUAS. The students never received explicit lessons in CT, when in fact this is the most important factor to increase CT (Abrami, et al., 2008). The implementation is designed to be integrated in the curriculum of RSU and DUAS, in contrast to other general interventions. This was the main goal of this research. This intervention could be used instantly by RSU and DUAS, in order to enhance CT among their students.

5.6 Recommendations on further Research

Results of this research showed a low reliability of the CT-HK. Also, the validity of this instrument is discussed. The CT-HK measures only four components of CT, with a small number of items for each subscale. For these reasons, it is recommended to use other measurements in addition to the CT-HK for measuring CT. For example, the WGCTA (Watson & Glaser, 1980, as cited in Bernard et al., 2008), is composed of 40 items, spread across five subscales: inference, recognition of assumptions, deduction, interpretation and evaluation of arguments (Bernard, et al., 2008). These subscales correspond to the skills defined by the Delphi Committee. The WGCTA is widely used and most studied CT measurement (Bernard et al., 2008). Using the WGCTA in combination with the CT-HK provide a more complete insight of the level of CT. The WGCTA measures more skills and dispositions, while the CT-HK measures the cultural component of CT. As concluded in the former paragraphs, social desirability and over-estimation of CT skills may have influenced the results. It is recommended to use other forms of measuring CT in addition to self-assessment instruments, such as the CT-HK and the WGCTA. For instance, CT can be measured by observing students doing an exercise in which CT skills should be applied, like Van Helsdingen et al. (2010) did. Measuring CT skills could be done by instantly observing students. Another option is to hand out an assignment in which students have to think critically. After completing the assessment by paper and pencil or by computer software, CT specialists could estimate the corresponding level of CT. In these examples, it is prevented that the social desirability bias of students and the over-estimation of one's skills are influencing the results.

Another recommendation is to investigate to what extent the lecturers are familiar with CT and which components of CT they think they are teaching. This is done earlier on by Alazzi (2008) and Shaheen (2016). This was done by a quantitative form of research, namely by interviewing the lecturers. If it is known to what extent teachers are familiar with CT, the results of this research could be interpreted more adequately. Furthermore, it has to be investigated to what extent the intervention as designed in this research leads to an improvement of CT among students. This can be done by an experimental research, in which the effect of the instructions will be measured.

5.7 The Implementation

In this paragraph, the intervention is described and in the appendices, examples of instructions are presented. Firstly, general interventions are summed up, these are interventions which do not correspond to a particular CT skills or a particular course in the curriculum of RSU and DUAS. Subsequently interventions for improving the logical attitude, evidence seeking and objectiveness are presented. The conditions described in paragraph 2.4 are applied to these interventions.

5.7.1 General Interventions

A prerequisite to teach students to think critically, is that teachers are skilled in CT as well (paragraph 2.3 and 2.4). To guarantee this, it is recommended to train lecturers to think critically, by a workshop or training. This has to be done before actual teaching student CT. Details of training lecturers is not discussed any further in this research, because the purpose of this research was to design an intervention for the students.

Another general intervention is to change the exams in the curriculum. Burkhalter and Shegebayev (2012) argue that multiple-choice tests and true-false tests should be eschewed. Multiple-choice

questions tend to focus on memorizing the subject, instead of thinking critically about it (Kerkman & Johnson, 2014). Instead, it should be tested if students are capable of understanding the literature, organizing thoughts and producing arguments. Also, students have to be challenged to show their reasoning skills. These skills can be better developed by grading students by having them write essays and instead of using multiple-choice tests (Burkhalter & Shegabayev, 2012). So, it is recommended for RSU and DUAS to replace multiple-choice tests by open-questions tests and writing assignments.

Furthermore, to ensure the quality of thinking, Paul and Elder (2008) set up intellectual standards which should be applied in the curriculum. These concepts are explained in paragraph 2.4.2. Table A.2 in Appendix C shows questions which can be asked to improve the quality of thinking. Furthermore, Brookfield (2007, pp. 28-31) suggests epistemological, experiential, communicative, and political questions that could be asked. Lecturers should ask all these kind of questions frequently, so the quality of thinking among students improves (Paul & Elder, 2008). Additionally, these questions could be asked during tests, instead of the multiple-choice questions. Also, during presentations and regular lessons, these questions should be asked by lecturers to students, so students learn to think critically.

5.7.2 Logical attitude and Reasoning

At RSU, students already receive a course in which they learn how to think logically, but DUAS students did not learn this explicitly, even though this is very important (Abrami, et al., 2008). Ten Berg, Van Gelder, Patterson and Teppema (2009) designed a learning method called Rationale: a method to teach students to think critically. Rationale is a software programme in which one learns to organize and visualize thoughts and argumentations, by designing argumentation-schemes. In the course Written Communication in the first year of Applied Psychology, students learn to write properly, by analyzing news items critically and writing different kinds of texts. Before analyzing and writing an essay or plea, it could be taught to students how to reason logically. The argumentation-schemes of Ten Berg et al. could help with that. After visualizing arguments, students should discuss these schemes. This is important in order to increase trans contextual transfer (Halpern, 2002) and to put answers in perspective (Crawford et al., 2005). At RSU, these argumentation-schemes could be used in the course Argumentation, as well. Figure A.1 in Appendix D shows an example of a argumentation-scheme.

Also in the courses Prevention and Applied Research, students should be skilled at logical thinking, reasoning and analysing. In these courses, it is expected of students to clearly communicate their ideas and arguments. From the second year, students need to design interventions and make recommendations to clients. To ensure adequate recommendations, the rules of reasoning should be taught to the students at the start of these courses. It is important that this will be taught explicitly (Heiltjes, et al., 2014). The book 'Asking the right questions' (in Dutch: '*De juiste vragen stellen*') by Browne and Keeley (2005) could function as a base for those lessons. This book discusses the rules of logic, sophistry and critical writing. Practising CT is also important (Heiltjes, et al., 2014). For example, Paul & Elder (2008) designed a template to analyse literature (Figure A.2 in Appendix D), which could be used in order to improve the logical thinking of students. Further, *Critical Thinking Skills* by Cottrell (2005) offers theory and exercises in argumentation. Students could do one exercise per week, and the lecturer could discuss it during the course. Lastly, RSU already teaches their students

to think logically in the course Argumentation. RSU could exchange the course Argumentation to DUAS, so DUAS also implements parts of the course Argumentation in their curriculum.

5.7.3 Evidence Seeking

In Cottrell's *Critical Thinking Skills* (2005), it is elaborated how to seek the most relevant evidence to support your own arguments. It is explained by her why using proper literature is important and how to distinguish relevant information from useless information. This skill is important for students to apply during the course Applied Research (at DUAS) and Research and Design (at RSU) because in these courses students learn how to do research. Therefore, it is recommended to teach students to seek evidence during this course. This can be done in two steps. Firstly, the relevance of seeking evidence should be taught to students. Chapter 8 ("Where is the proof?") of Cottrell's *Critical Thinking Skills* (2005) could be used as base for this lecture. Secondly, learning how to seek evidence has to be done by analyzing articles through answering certain questions. These answers could be presented in a presentation or an essay, by the students. In Appendix C, there are two tables with different kind of questions to be asked. Especially Table A.3 is helpful, because these questions examine the evidence of a source.

5.7.4 Objectiveness

Being objective is an affective disposition of CT (Facione, 2015). So this makes it harder to teach to students, because, in contrast to skills, it can't be taught explicitly. Nevertheless, CT skills and dispositions are strongly correlated to each other (Ten Klooster, 2015), so if the CT skills are enhanced, dispositions will also be improved. Thus, aforementioned exercises should improve the students' objectiveness as well. Based on the items of the CT-HK, being objective is to put things in a greater perspective, making unbiased judgements and being aware of biases. Putting things in a greater perspective can be done by being open-minded towards others' opinions and cultures. Listening to others is already done in the course Coaching, Counselling and Training at DUAS. And at RSU, students have a course in which they learn to treat patients. In these courses, students learn how to have professional conversations with clients. Teaching how to be objective could be done in this course by asking question to the students. For instance, questions corresponding to the standards clarity, relevance, breadth, and most importantly, depth (Appendix C), could help improve the students' objectiveness. When practising professional conversations during classes, lecturers could give students feedback with help of these questions, and also, students could ask each other those questions.

5.7.5 Embedding and evaluating the Implementation

When DUAS and RSU are embedding CT in their curriculum, firstly, the managers of RSU and DUAS have to research if implementing CT as proposed in this paragraph is enforceable. Secondly, the senior lecturers have to modify the course curricula, in order to integrate CT in it. As a former student, the Applied Psychologist (AP) has experience with the course curriculum, especially at DUAS, so this could be outsourced to an AP. There also have to be writing new teaching materials and new exams in which components of CT are imbedded. This also can be outsourced to an AP. Furthermore course lecturers have to be prepared to teach CT as described in 5.7.1. After these steps, CT is integrated in the curriculum.

As described in chapter 2, evaluating the curriculum consequently is needed (Halpern, 2002; Flores et al., 2012). Also this could be an excellent job for an AP. The AP could observe classes in order to investigate if teachers challenge their students to think critically, by asking questions. Also, he/she could examine if the intervention (theory and assignments) is implemented correctly. Furthermore, the AP can investigate to what extent the intervention leads to an improvement in CT among students. This can be done by an experimental research, in which the effect of the implementation will be measured. Lastly, the AP is taught to provide workshops and trainings, so he/she can also teach the lecturers at RSU and DUAS how to teach CT.

A regular AP has very little experience with CT, because it is not taught explicitly at DUAS yet. However, the aforementioned tasks require someone with experience in CT. Therefore, it is recommended to hire a AP who obtained a Honours Degree. In the Honours Programme Liberal Arts & Science: Global Citizenship, students learn to think critically (DUAS, 2016b), so an AP with this Honours Degree has the required experience.

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Appendix A: CT-HK in Dutch

Beste TP studenten,

In het kader van onze scriptie doen wij een onderzoek naar de mate van kritisch denken onder tweedejaars TP studenten op deze hogeschool. Dit onderzoek wordt uitgevoerd in opdracht van en in samenwerking met deze hogeschool en een Russische staatsuniversiteit, waar deze vragenlijst ook zal worden afgenomen. Om deze reden willen wij jullie vragen om de hierop volgende vragenlijst volledig in te vullen. De vragenlijst bestaat uit twee gedeelten. In het eerste gedeelte vragen wij om enkele demografische gegevens en het tweede gedeelte omvat 18 stellingen over het onderwerp kritisch denken. Het invullen van de vragenlijst kost ongeveer 10 minuten van je tijd. Je kunt er zeker van zijn dat wij zeer vertrouwelijk met de uitkomsten om zullen gaan en er zal geen informatie worden doorgegeven aan derden. Alvast bedankt voor je medewerking!

Met vriendelijke groet,

Maaïke Wientjes en Ruud Dongstra

Studentnummer:

Geslacht:

- ☐ Man
- ☐ Vrouw

Nationaliteit:

Hoeveel studiepunten heb je in het eerste jaar behaald?

Het volgende gedeelte bestaat uit 18 stellingen die gaan over het onderwerp kritisch denken. Er zijn telkens vijf antwoordmogelijkheden, namelijk: Oneens, een beetje oneens, neutraal (geen mening), een beetje eens en eens. Geef aan in hoeverre je het eens bent met de stelling.

	Oneens	Een beetje mee oneens	Neutraal	Een beetje mee eens	Eens
1. Ik probeer logische verklaringen te geven zodat iedereen mijn intenties kan begrijpen en het hiermee eens kan worden.					
2. Ik tracht ordelijke plannen te maken om complexe problemen aan te pakken.					
3. Ik probeer aannames en definities van begrippen in betogen te verhelderen.					
4. Ik probeer de gedachten die anderen geuit hebben te organiseren en te verduidelijken door het in mijn eigen woorden te vertalen.					
5. Wanneer ik moet omgaan met iets dat heel complex is, neig ik tot paniek.					
6. Ik wil verschillende soorten mensen ontmoeten en veel van ze leren.					
7. Ik denk dat het belangrijk is om te leren over de denkstijlen van mensen uit andere landen					
8. Ik ben geïnteresseerd in mensen met andere ideeën dan ik.					
9. Ik wil andere culturen bestuderen.					
10. Het zou prachtig zijn om mijn hele leven nieuwe dingen te studeren.					
11. Ik probeer vanuit een groot aantal verschillende perspectieven te denken en mij hierin niet te beperken					
12. Ik probeer objectief een besluit te nemen.					
13. Wanneer ik over iets aan het denken ben, ben ik geneigd om het alleen vanuit mijn eigen perspectief te beschouwen.					
14. Ik probeer altijd onpartijdige oordelen te maken.					

15. Het baart me zorgen dat ik vooroordelen zou kunnen hebben waar ik me niet van bewust ben.					
16. Wanneer ik over iets oordeel, bestudeer ik de relevante feiten en bewijzen.					
17. In elke situatie heb ik enige achterdocht voordat ik iets geloof.					
18. Wanneer ik iets concludeer, houd ik mij vast aan het feitelijke bewijs.					

Hartelijk dank voor het invullen van de vragenlijst.

Appendix B: CT-HK in English

In the table below all items of the CT-HK are presented, as well as the corresponding subscales.

Table A.1

CT-HK and corresponding subscales

Item	Full description	Subscale
CTHK 1	I try to provide logical explanations so that everyone can understand and agree with what I mean.	Logical attitude
CTHK2	I try to develop orderly plans to address complex problems.	Logical attitude
CTHK3	I try to clarify the assumptions and definition of terms in arguments.	Logical attitude
CTHK4	I try to organize and clarify the thoughts that others have expressed by using my own words.	Logical attitude
CTHK5 (recoded)	When I have to deal with something really complex, I tend to panic.	Logical attitude
CTHK6	I want to meet different kinds of people, and to learn a lot from them.	Inquisitiveness
CTHK7	I think that it is important to learn about the thinking styles of people from other countries.	Inquisitiveness
CTHK8	I am interested in people with different ideas than me.	Inquisitiveness
CTHK9	I want to study about other cultures.	Inquisitiveness
CTHK10	Studying new things all my life would be wonderful.	Inquisitiveness
CTHK11	I try to think not only from a few perspectives but from a lot of different perspectives.	Objectiveness
CTHK12	When I decide something, I try to be objective.	Objectiveness
CTHK13 (recoded)	When thinking about something, I tend to consider it only from my own perspective.	Objectiveness
CTHK14	I always try to make unbiased judgements.	Objectiveness
CTHK15	It concerns me that I might have biases that I am not aware of.	Objectiveness
CTHK16	When I judge something, I examine the relevant facts and evidence.	Evidence-seeking
CTHK17	I do not believe without casting at least some suspicion in every situation.	Evidence-seeking
CTHK18	When I conclude, I stick to the concrete evidence that has been presented.	Evidence-seeking

Appendix C: Questions

In this appendix, questions that could be asked, are elaborated. Table A.2 is based on Paul & Elder's *Miniature Guide to Critical Thinking* (2008), and Table A.3 is based on Cottrell's *Critical Thinking Skills* (2005).

Table A.2

Intellectual standards and corresponding questions.

Standard	Questions to ask
Clarity	Could you elaborate further on that point? Could you express that point in another way? Could you give me an illustration? Could you give me an example? Could you illustrate what you mean?
Accuracy	Is that really true? How could we check that? How could we find out if that's true? How could we verify or test that?
Relevance	How is that connected to the question? How does that bear on the issue? How does that relate to the problem? How does that help us with the issue?
Precision	Could you give me more details? Could you be more specific? Could you be more exact?
Depth	How does your answer address the complexities in the question? How are you taking into account the problems in the question? Are you dealing with the most significant factors? What factors make this a difficult problem? What are some of the complexities of this question?
Breadth	Do we need to consider another point of view? Is there another way to look at this question? What would this look like from a conservative standpoint? What would this look like from the point of view of...?
Logic	Does this really make sense? Does that follow from what you said? How does that follow? Before you implied this and now you are saying that, I don't know how both can be true. Explain this. Does your first paragraph fit with your last?

	Does what you say follow from the evidence?
Significance	Is this the most important problem to consider? Is this the central idea to focus on? Which of these facts are the most important?
Fairness	Are we considering all relevant viewpoints in good faith? Do I have any vested interest in this issue? Are we distorting some information to maintain our biased perspective? Are we more concerned about our vested interest than the common good? Am I sympathetically representing the viewpoints of others?

Note. This table is based on *The miniature guide to critical thinking* (pp. 8-10), by R. Paul & L. Elder, 2008, Tomales, CA: The critical thinking foundation.

Table A.3

Questions to ask to examine the evidence of an article.

Standard	Questions to ask
Evidence	How do we know this is true? How reliable is this source? Are the examples given truly a representative of whole area? Does this match what I already know? Does this contradict other evidence? What motive might this person have for saying this? What are we not being told? Are any other explanations possible? Do the reasons support the conclusion? Is the author's line of reasoning well substantiated by the evidence?

Note. This table is based on *Critical Thinking skills* (p. 128), by S. Cottrell, 2005, New York, NY: Palgrave Macmillan.

Appendix D: Logical Thinking

Figure A.1 shows an argumentation scheme as used in Rationale (Ten Berg, et al., 2009). Figure A.2 is a template which can be used to analyse literature.

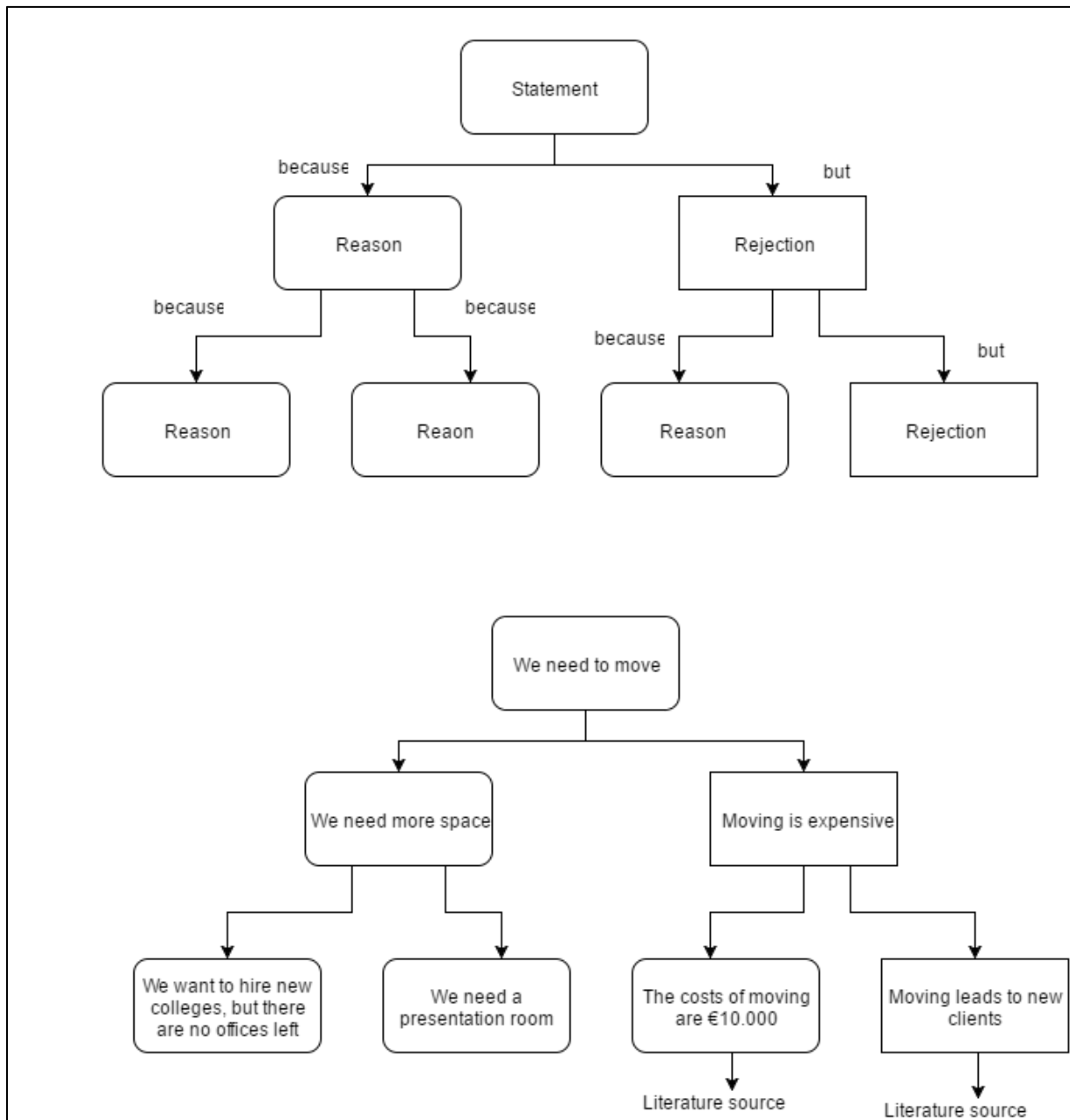


Figure A.1. Argumentation Scheme. Figure based on *Kritisch Denken, redeneren en betogen met rationale*, by T. Ter Berg, T. Van Gelder, F. Patterson and S. Teppema, 2009, Amsterdam, The Netherlands: Pearson Education. Copyright 2009 by Pearson Education.

Template for Analyzing the logic of an article

Take an article that you have been assigned to read for class, completing the 'logic' of it using the template below. This template can be modified for analyzing the logic of a chapter in a textbook.

1. The main purpose of this article is: _____
(state as accurately as possible the author's purpose for writing the article)
2. The key question that the author addressing is: _____
(figure out the key question in the mind of the author when s/he wrote the article)
3. The most important information in the article is: _____
(Figure out the facts, experiences, data the author is using to support her/his conclusions)
4. The main inferences/conclusion in the article are: _____
(identify the key conclusions the author come to and presents in the article)
5. The key concept(s) we need to understand in this article is/are: _____
By these concepts, the author means: _____
(Figure out the most important ideas you would have to understand in order to understand the author's line of reasoning)
6. The main assumption(s) underlying the author's thinking use is/are: _____
(Figure out what the author is taking for granted [that might be questioned].)
- 7a. If we take this line of reasoning seriously, the implications are _____
(What consequences are likely to follow if people take the author's line of reasoning seriously?)
- 7b. If we fail to take this line of reasoning seriously, the implications are _____
(What consequences are likely to follow if people ignore the author's reasoning?)
8. The main point(s) of view presented in this article is/are _____
(What is the author looking at, and how is s/he seeing it?)

Figure A.1. Template for analyzing logic of an article. Reprinted from: *The miniature guide to critical thinking*, (p. 11), by R. Paul & L. Elder, 2008, Tomales, CA: The critical thinking foundation. Copyright 2008 by The Critical Thinking Foundation.

Appendix E: Personal Work Statement

Eigen werk verklaring/ Personal work statement

Ondergetekende(n) / The undersigned:

[Naam student/ namen studenten]

[Name student / Names students]

Maaïke Wientjes (335840)

verklaart /verklaren ondubbelzinnig dat: / Hereby unequivocal declares / declare that:

1. het volgende werkstuk eigen werk is en derhalve geen inbreuk maakt op het auteursrecht van een ander, / The following paper is a personal paper and is therefore no infringement of anyone's copyright;
2. alle gebruikte bronnen (waaronder internet-pagina's) zijn voorzien van bronvermelding door middel van voetnoten, / All sources used (including websites) have been referred to in footnotes,
3. het verslag voor niet meer dan 5% aan overgenomen passages uit "werk van anderen" bevat. / The paper is not to include more than 5% of "third parties" excerpts.

Plaats/ Place: Deventer

Datum/Date: 4 juli 2016

Handtekening(en) / Signature(s)