

LIMITED DOWNLOAD COPY

**The Miniature Guide
to**

Critical Thinking
CONCEPTS AND TOOLS

*By Dr. Richard Paul
and
Dr. Linda Elder*

The Foundation for Critical Thinking
www.criticalthinking.org
707-878-9100
cct@criticalthinking.org

Why A Critical Thinking Mini-Guide?

This miniature guide focuses on the essence of critical thinking concepts and tools distilled into pocket size. For faculty it provides a shared concept of critical thinking. For students it is a critical thinking supplement to any textbook for any course. Faculty can use it to design instruction, assignments, and tests in any subject. Students can use it to improve their learning in any content area.

Its generic skills apply to all subjects. For example, critical thinkers are clear as to the purpose at hand and the question at issue. They question information, conclusions, and points of view. They strive to be clear, accurate, precise, and relevant. They seek to think beneath the surface, to be logical, and fair. They apply these skills to their reading and writing as well as to their speaking and listening. They apply them in history, science, math, philosophy, and the arts; in professional and personal life.

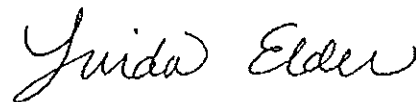
When this guide is used as a supplement to the textbook in multiple courses, students begin to perceive the usefulness of critical thinking in every domain of learning. And if their instructors provide examples of the application of the subject to daily life, students begin to see that education is a tool for improving the quality of their lives.

If you are a student using this mini-guide, get in the habit of carrying it with you to every class. Consult it frequently in analyzing and synthesizing what you are learning. Aim for deep internalization of the principles you find in it—until using them becomes second nature.

If successful, this guide will serve faculty, students, and the educational program simultaneously.



Richard Paul
Center for Critical Thinking



Linda Elder
Foundation for Critical Thinking

Contents

Why Critical Thinking?	4
The Elements of Thought	5
A Checklist for Reasoning	6
Questions Using the Elements of Thought	8
The Problem of Egocentric Thinking	9
Universal Intellectual Standards	10
Template for Analyzing the Logic of Articles and Textbooks	13
Criteria for Evaluating Reasoning	14
Essential Intellectual Traits	15
Three Kinds of Questions	18
A Template for Problem-Solving	19
Analyzing and Assessing Research	20
What Critical Thinkers Routinely Do	21
Stages of Critical Thinking Development	22

Why Critical Thinking?

The Problem:

Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed or down-right prejudiced. Yet the quality of our life and that of what we produce, make, or build depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. Excellence in thought, however, must be systematically cultivated.

A Definition:

Critical thinking is the art of analyzing and evaluating thinking with a view to improving it.

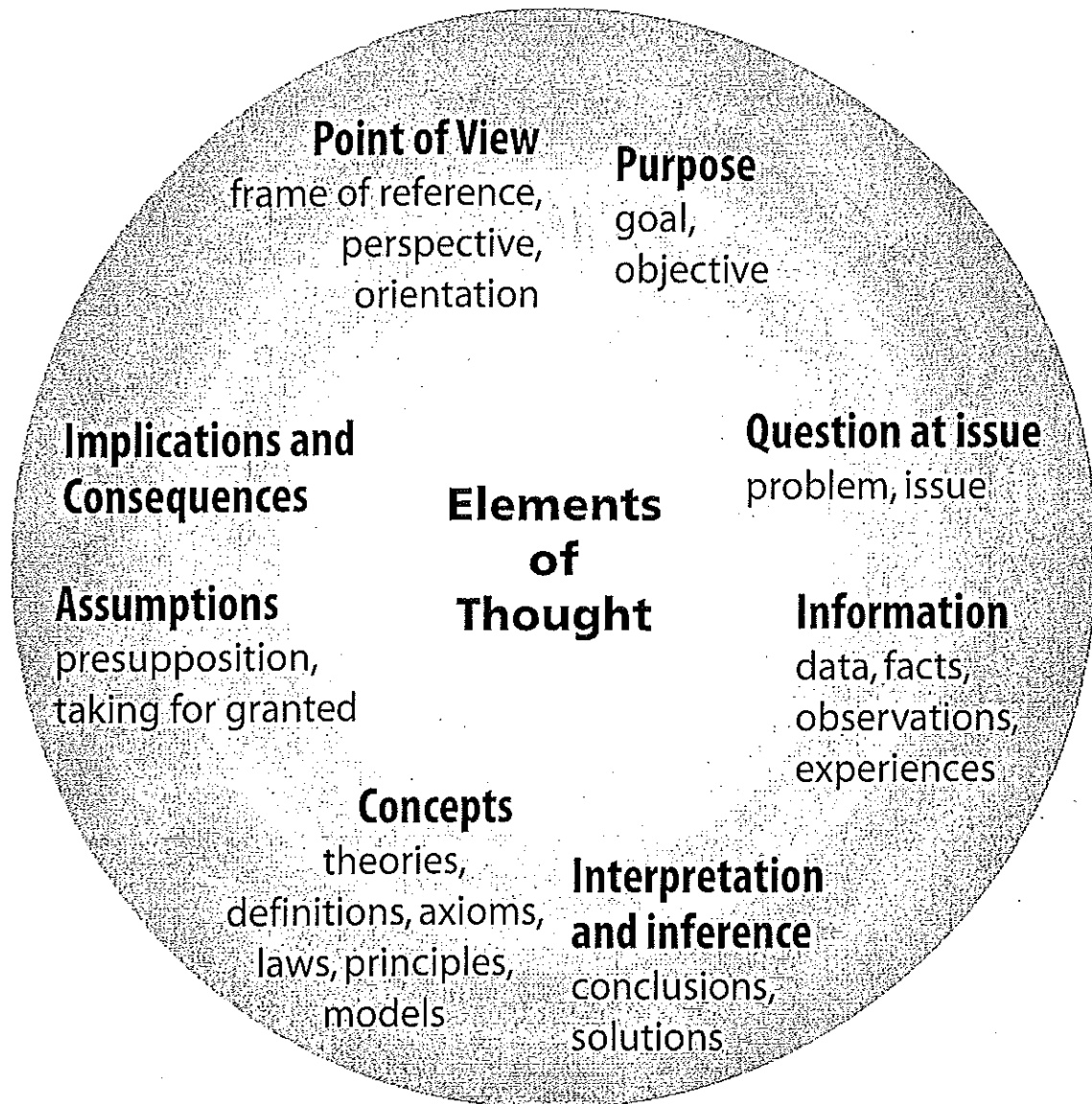
The Result:

A well cultivated critical thinker:

- raises vital questions and problems, formulating them clearly and precisely;
- gathers and assesses relevant information, using abstract ideas to interpret it effectively;
- comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards;
- thinks openmindedly within alternative systems of thought, recognizing and assessing, as need be, their assumptions, implications, and practical consequences; and
- communicates effectively with others in figuring out solutions to complex problems.

Critical thinking is, in short, self-directed, self-disciplined, self-monitored, and self-corrective thinking. It requires rigorous standards of excellence and mindful command of their use. It entails effective communication and problem solving abilities and a commitment to overcome our native egocentrism and sociocentrism.

The Elements of Thought



Used With Sensitivity to Universal Intellectual Standards

Clarity → Accuracy → Depth → Breadth → Significance
Precision
Relevance

Clarity

Could you elaborate further?
Could you give me an example?
Could you illustrate what you mean?

Accuracy

How could we check on that?
How could we find out if that is true?
How could we verify or test that?

Precision

Could you be more specific?
Could you give me more details?
Could you be more exact?

Relevance

How does that relate to the problem?
How does that bear on the question?
How does that help us with the issue?

Depth

What factors make this a difficult problem?
What are some of the complexities of this question?
What are some of the difficulties we need to deal with?

Breadth

Do we need to look at this from another perspective?
Do we need to consider another point of view?
Do we need to look at this in other ways?

Logic

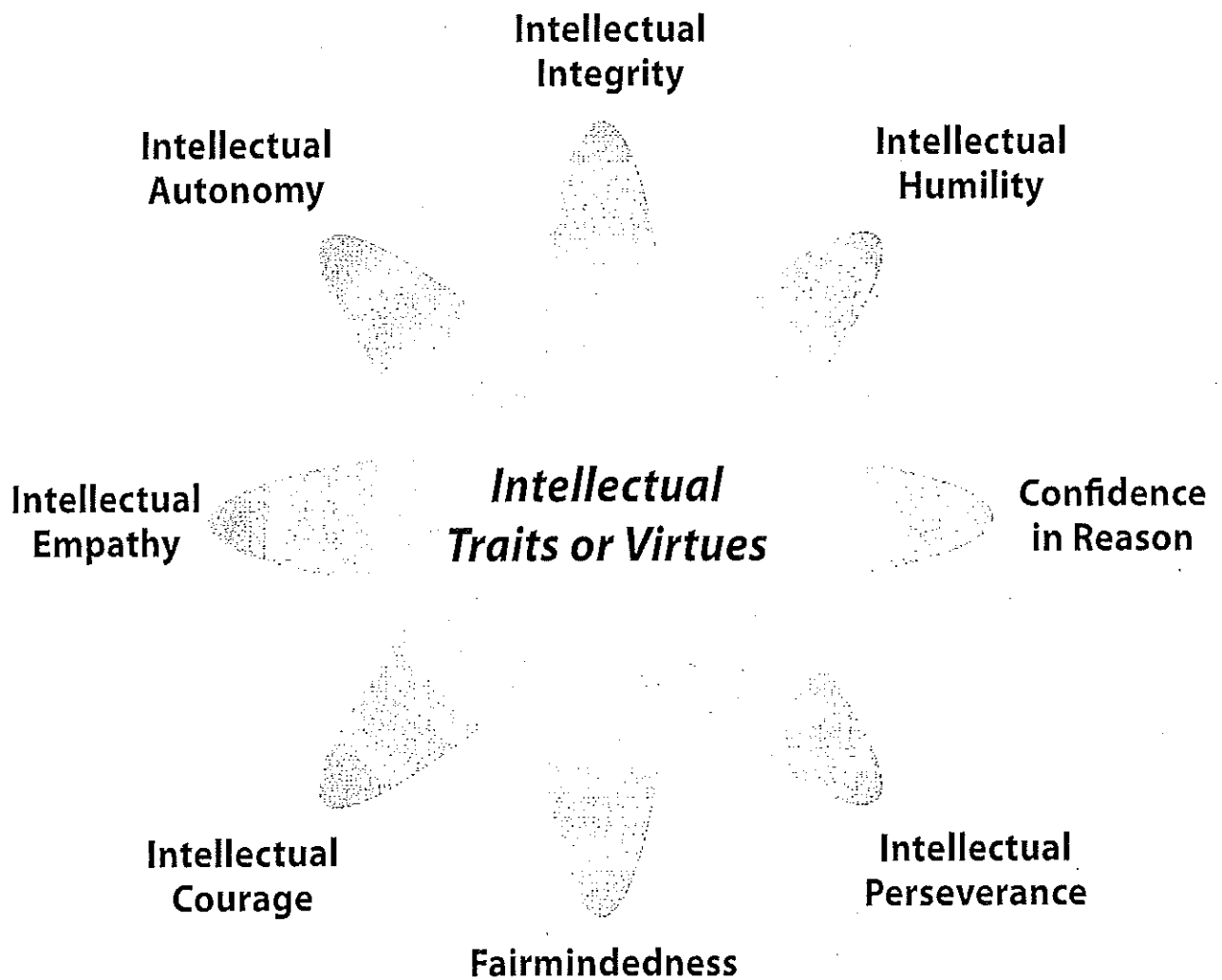
Does all this make sense together?
Does your first paragraph fit in with your last?
Does what you say follow from the evidence?

Significance

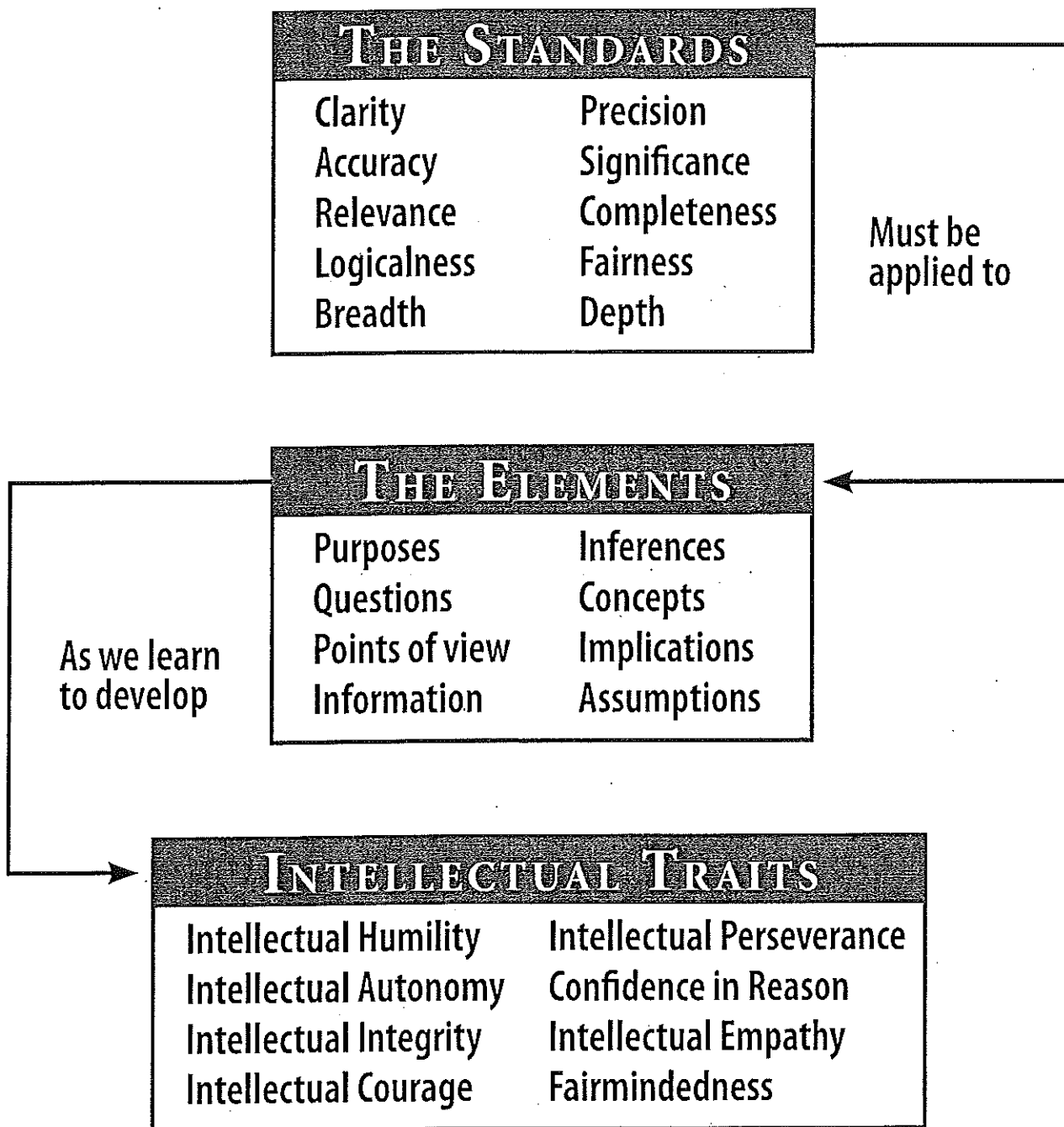
Is this the most important problem to consider?
Is this the central idea to focus on?
Which of these facts are most important?

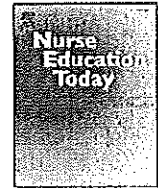
Fairness

Do I have any vested interest in this issue?
Am I sympathetically representing the viewpoints of others?



Critical thinkers routinely apply the intellectual standards to the elements of reasoning in order to develop intellectual traits.





Review

A systematic review of critical thinking in nursing education

Zenobia C.Y. Chan *

School of Nursing, The Hong Kong Polytechnic University, Hung Hom, Hong Kong

ARTICLE INFO

Article history:

Accepted 9 January 2013

Keywords:

Critical thinking
Nursing education
Systematic review
Teaching strategy

SUMMARY

Objectives: This review aimed to explore how critical thinking is perceived in previous studies of nursing education, and analyse the obstacles and strategies in teaching and learning critical thinking mentioned in these studies.

Design: Systematic review.

Data sources: This review was based on the following five databases: The British Nursing Index, Ovid Medline, CINAHL, PsycINFO and Scopus.

Review methods: After the screening process and evaluation through using the Critical Appraisal Skills Programme tool, 17 studies were identified that met the inclusion and quality criteria. The studies were read through several times and analysed through thematic synthesis.

Results: A total of three themes were developed. The first theme, components for critical thinkers, suggests the abilities and attitudes that critical thinkers should have. The other two themes, influential factors of critical thinking in nursing education, and strategies to promote critical thinking, describe the obstacles and strategies in teaching and learning critical thinking.

Conclusions: The 17 studies illustrated that the definition and concept of critical thinking may change from time to time, and hence there is a need to clarify educators' perspective towards critical thinking. There is also a need to evaluate the efficacy of the new strategies mentioned in several selected studies, such as art-based, questioning, cross-cultural nursing experience, and preceptorship. With a better understanding of critical thinking in nursing education, educators and nursing faculty are able to develop better strategies in enhancing critical thinking development in nursing students, in turn preparing them for future clinical practice.

© 2013 Elsevier Ltd. All rights reserved.

Introduction

Due to the increased need for patient-centred care, evidence-based practice, and addressing patients' satisfaction in care and staff shifting issues, the healthcare environment is becoming more complex and demanding. To be more competent and put out higher performance, the importance of critical thinking (CT) and its dispositions is emphasised in nursing clinical practice (Chang et al., 2011). Given the 11 affective components and 7 cognitive skills of CT (such as open-mindedness, flexibility, self reflective, information seeking and analysing), CT can improve patients' outcomes through enabling nurses to perform more evidence-based practice rather than guessing the facts (Profetto-McGrath, 2005; Scheffer and Rubenfield, 2000). Nursing managers also required CT to improve the efficiency of the professional practice environment (Zori et al., 2010). This indicates that managers who are good critical thinkers

have the ability to develop a positive working environment, in turn increasing nursing staff's retention, job satisfaction and working performance. As CT is an important skill in nursing, teaching and introducing nursing students to CT is necessary and should be started early, as the skills develop through experience and practice (Castledine, 2010; Di Vito-Thomas, 2005).

Doing reviews on CT in nursing education is not a new idea, and several relevant reviews were retrieved (such as Simpson and Courtney, 2002; Staib, 2003; Thompson and Stapley, 2011; Turner, 2005; Worrell and Profetto-McGrath, 2007; Yuan et al., 2008). In the six reviews, three focused only on interventions, strategies and measurement. Two reviews explored CT concepts in nursing education, however the review timeframes were 1981 to 2002 (Turner, 2005) and 1989 to 2000 (Simpson and Courtney, 2002). Only Worrell and Profetto-McGrath (2007) did a review that described both concepts and strategies, however their study was a literature review. Although previous literature reviews have been conducted relative to CT in nursing education, few recent systematic reviews have been conducted. This systematic review aims to review qualitative studies from 2002 to 2011, in order to explore how critical thinking

* Tel.: +852 2766 6426; fax: +852 2364 9663.
E-mail address: zenobia.chan@polyu.edu.hk

is perceived in the studies of nursing education, and the obstacles and strategies in teaching and learning critical thinking mentioned in these studies.

The Review

This review was conducted by doing a computer-assisted literature search of the following five databases: The British Nursing Index, Ovid Medline, CINAHL, PsycINFO and Scopus. A combination of the following keywords was used to search for relevant studies regarding CT in nursing education: critical thinking/think critically and nurs* and curriculum/lecture/teach*/learn*/program*/educat*/class* and qualitative/study/research/interview*/questionnaire*. To limit the amount of studies and focus on the recent trend of nursing education, a time frame from 2002 to 2011 was set, as well as being limited to peer-reviewed and English studies. The reference lists of relevant review studies were screened to look for potential articles.

After searching the potentially relevant studies from the five databases and excluding the duplicated results, 1334 articles were achieved. After the screening of titles, abstracts and full papers according to the predetermined criteria, 18 articles were included. The selection criteria are: (a) studies that reported the perceptions of CT in nursing students and educators, (b) studies that reported an intervention or course that had an impact on nursing students' CT skills and ability, (c) primarily targeted nursing educators, undergraduate/graduated nursing students, and (d) qualitative research or mixed method research that contained separate analyses of quantitative and qualitative data. Studies that did not have a clear population size or reported hospital orientation programmes were not considered. When compared to mere quantitative data, qualitative data provides a more in-depth discussion and content analysis of participants' perspective in CT. Therefore, this study only included the articles with qualitative results. The 18 articles were further evaluated through using a CASP (Critical Appraisal Skills Programme) tool from the NHS Public Health Resource Unit (2009) for quality appraisal. It is a checklist for systematic reviews in health studies. There was one article excluded due to its incomplete description of the method used. The remaining 17 articles were double checked and confirmed that they should all be included in the review (Fig. 1).

The data of the studies were extracted to Table 1 under the following headings: year and origin, aims, design and data collection, participants, and research findings and implications. Thematic synthesis was adopted to analyse the results to identify and thematise important and similar data and patterns. The papers were read through several times to confirm that all crucial data that impacted nursing education were integrated.

Results

A total of 17 studies were included in this review, including 14 qualitative studies and three mixed method studies. The sample sizes in the studies that involved a qualitative research form ranged 6–70. Six studies included nursing educator participants, six included nursing student participants, four included both educator and student participants, and one included newly graduated nurses who were attending a learning course and were considered as learners in this study. Most of the studies were conducted in western countries, namely the USA ($n=5$), Canada ($n=3$), Europe ($n=3$), and New Zealand ($n=1$). Others were conducted in Asia ($n=2$), Africa ($n=1$), Unknown ($n=1$), and USA and Thailand ($n=1$). Three themes were developed from the 17 studies: (i) components for critical thinkers, (ii) factors influencing critical thinking in nursing education, and (iii) strategies to promote critical thinking (Table 2).

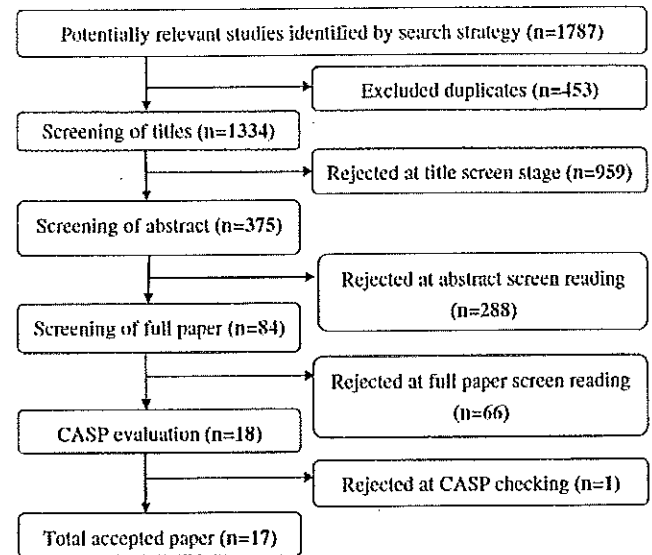


Fig. 1. Flow diagram of the systematic review process.

Components of Critical Thinkers

Although the definition of CT varies, the components of a critical thinker are identified in five articles. The components included: (i) gathering and seeking information, (ii) questioning and investigating, (iii) analysis, evaluation, and inference, and (iv) problem solving and application of theory.

The characteristic of being able to gather and seek information was reported in four articles (Jenkins, 2011; Twibell et al., 2005; Walthew, 2004; Zygmunt and Schaefer, 2006). Educators in Walthew (2004, p. 409) emphasised that students "need to consider all aspects of the situation before taking action. Information needs to be gathered from a wide range of sources before the situation can be analysed and a solution determined". Although the study emphasised this point, the author did not further explain actions that should be taken to gather information.

The other three studies addressed the gap, and the suggested actions were questioning and investigating. Educators believed that critical thinkers do not passively accept information from others or look at information in a cursory way. Instead, thinkers question, seek, and examine for answers and deeper meanings. The educators revealed that they love to see students asking questions, as this process indicates that students are thinking critically.

Three abilities (analysis, evaluation and inference) that appear as a subscale in the California Critical Thinking Skills Test are also mentioned in the studies (Jenkins, 2011; Twibell et al., 2005; Zygmunt and Schaefer, 2006). Therefore, besides seeking information, students should also learn the ability to examine information and context, consider all aspects, understand and discriminate data, and link information together to synthesise appropriate decisions or solve problems.

Lastly, students were also regarded as critical thinkers when they were able to put knowledge/theory into practice, consider the bigger picture, understand the thinking process, be reflective and sensitive, predict upcoming situations and know what to do next (Jenkins, 2011; Kaya et al., 2011; Twibell et al., 2005; Walthew, 2004).

Factors influencing critical thinking in nursing education

There were nine studies that mentioned the factors influencing CT in nursing education. According to the studies, the influential factors were

Table 1
Summary of reviewed studies.

Author, year, and country	Design and data collection	Participants	Results and implication to nursing education
Jenkins (2011) USA and Thailand	–Qualitative method –Individual interviews	–Purposive sampling –5 educators from Thailand and 5 educators from USA	–Cross-cultural experience allowed students to accept different points of view, and to explore deeper meanings of CT. –Cross-cultural nursing is suggested to teach students CT.
Kaya et al. (2011) Turkey	–Qualitative method –In-depth interviews	–7 nursing students who attended the Critical Thinking course	–The course allowed students to get a bigger picture of CT. –CT course is necessary and should be offered as a separate course, rather than incorporate with other subjects.
Hofsten et al. (2010) Swedish	–Qualitative and descriptive study	–69 undergraduate nursing students who participated in the case seminars	–Case method strengthened students' understanding and encouraged students to think critically, which is important in nursing practice.
Kaddoura (2010) USA	–Qualitative questionnaires and interviews	–10 newly graduated ICU nurses who attended the clinical simulation course	–Educators should offer simulation activities for students to promote learning, leadership skills and CT.
Mun (2010) Korea	–Qualitative –Informal narratives	–30 junior nursing students in psychiatric ward	–Writing narratives could promote students to develop CT communication skills and reflective skills.
Callister et al. (2009) USA	–Descriptive qualitative study –Reflective writing	–70 baccalaureate nursing students	–Reflective writing allowed students to learn from clinical experiences, improved ethical decision making and encouraged them to think critically.
Casey (2009) Ireland	–Qualitative –Art inquiry approach, group discussions	–20 second year nursing undergraduate students who were taking Nursing Humanities module	–It is hoped that more educators could consider art-based approach as a method of nurturing CT and aesthetic knowing in nursing education.
Rush et al. (2008) USA	–Explorative qualitative –Audiotaped and internet discussion	–33 first semester RN-to-BSN students	–Distance stimulation has potential to foster the CT ability in distance, however, the reality of the stimulation and immediate feedback must be considered.
Hicks-Moore and Pastirik (2006) Unknown	–Mixed method –HCTSR scores and focus group interviews	–42 nursing students and six clinical instructors	–To benefit from concept map, it is important to provide students the opportunities to use the method on a regular and ongoing basis.
Zygmunt and Schaefer (2006) USA	–Quantitative and qualitative study –California Critical Thinking Skills test and telephone interview	–Randomised 300 full-time nurses from National League for Nursing membership schools, whereas 12 participants conducted interviews	–The narrative data indicated that nursing faculty mostly emphasised CT performance in clinical setting. –Faculties should pay some attention into the theoretical portion and develop students' CT in the classroom environment.
Mangena and Chabell (2005) South Africa	–Qualitative, –Focus group interviews	–Purposive sampling –Seven nurse educators and 12 fourth year nursing students	–Nursing educators should introduce CT training to students –Educators should cultivate their knowledge in CT and often reflect their teaching and assessment method.
Raymond and Profetto-McGrath (2005) Canada	–Mixed methods –Descriptive, exploratory design	–11 full-time nurse educators, whereas six educators participated in the interview.	–Nurse educators play the active role in promoting CT. –Educators must acquire appropriate CT knowledge and know the way to facilitate students' CT skills.
Twibell et al. (2005) USA	–Qualitative study –Ethnographic methods	–Six clinical nursing instructors who have at least five years of clinical nursing experience and one year of clinical teaching experience.	–To facilitate students' CT, teachers should have good questioning skills. –Activities such as clinical conferences, reflection, group discussion and journaling are beneficial.
Myrick and Yonge (2004) Canada	–Individual interviews –Grounded theory –Semi-structural interviews	–8 preceptors with a minimum of 1 year teaching experience and 10 graduate nursing students	–As good preceptorship experience is plays critical role in enhancing CT in students, therefore it is important to have educators recognising the appropriate attitudes
Walthev (2004) New Zealand	–Descriptive interpretive approach –Semi-structured interviews	–12 nurse educators with a minimum of 10 years teaching experience	–This study presented the concept of CT to other educators. With a clear, meaningful definition of CT, nursing educators would grasp a better idea in facilitating CT development
Kawashima (2003) Japan	–Qualitative methods –Individual interviews	–Seven educators who had nursing training in USA and Australia	–Educators need to be more open-minded, flexible and reflective on the traditional teaching methods.
Myrick (2002) Canada	–Grounded theory approach –32 audiotape recorded interviews	–6 fourth year baccalaureate nursing undergraduates and 6 clinical preceptors who have 7 to 30 years of preceptorship experiences.	–It is crucial to accept the students as part of the faculty and value students' thoughts and feelings. –Preceptor should aware that role modelling, facilitating, guiding and prioritising could influence students' CT.

categorised into four categories: (i) students, (ii) educator, (iii) education system, and (iv) atmosphere/environment.

The first category is "students". Students' cultural background may either hinder or facilitate CT. According to three articles (Jenkins, 2011; Kawashima, 2003; Mangena and Chabell, 2005), students in some countries or cultures try to avoid conflicts, do not question teachers, and are aware of tradition seniority systems. Such cultural backgrounds may prevent students from speaking out and thinking critically. In addition, Mangena and Chabell (2005) revealed that language barriers may play a role, as students who are not being educated in their mother tongue may focus on translating rather than thinking critically. Students' lack of awareness or lack of a foundational basis of CT is also viewed as an obstacle. Kawashima (2003), Myrick (2002), and Zygmunt and Schaefer (2006) pointed out that some students lacked confidence. They did not express their opinions or learn to

think critically because they were too focused on getting the right answers and afraid of making mistakes.

The second category is "educator". Four studies (Kawashima, 2003; Mangena and Chabell, 2005; Myrick, 2002; Myrick and Yonge, 2004; Twibell et al., 2005; Zygmunt and Schaefer, 2006) pointed out that educators' role, attitude and belief play some role in influencing students' CT. According to the studies, educators should be open-minded, flexible, supportive and approachable. They should not hold strong beliefs (such as their own ideas, hierarchy), but rather value and trust students' opinions, accept changes and be open to students' challenges. Mangena and Chabell (2005) pointed out that educators who lacked knowledge of nursing education trends and CT would not succeed in facilitating students' CT. Lastly, educators' behaviours, such as role modelling, facilitating, guiding and prioritising, play some role in developing students' CT (Myrick, 2002; Raymond and Profetto-McGrath, 2005).

Table 2
Mapping of reviewed articles and the themes.

Author, year, and country	Components of critical thinking	Factors influencing critical thinking in nursing education	Strategies to promote critical thinking
Jenkins (2011) USA and Thailand	✓	✓	✓
Kaya et al. (2011) Turkey	✓	✓	✓
Hofsten et al. (2010) Swedish			✓
Kaddoura (2010) USA			✓
Mun (2010) Korea			✓
Callister et al. (2009) USA			✓
Casey (2009) Ireland			✓
Rush et al. (2008) USA			✓
Hicks-Moore and Pastirik (2006)			✓
Unknown			
Zygmunt and Schaefer (2006) USA	✓	✓	
Mangena and Chabeli (2005) South Africa		✓	
Raymond and Profetto-McGrath (2005) Canada		✓	✓
Twibell et al. (2005) USA	✓	✓	✓
Myrick and Yonge (2004) Canada		✓	✓
Walthev (2004) New Zealand	✓		
Kawashima (2003) Japan		✓	
Myrick (2002) Canada		✓	✓

The third category is “education system”. A study in Japan (Kawashima, 2003) indicated that lack of cultural sensitivity and a traditional education system hinder the growth of CT. When integrating a new concept, cultural appropriateness should be considered. The emphasis on rote learning, classroom teaching, and the power relationship between teachers and students discouraged students from cultivating CT skills and ability. Nursing education systems should value the importance of CT and teach it as a subject. Mangena and Chabeli (2005) reported that CT lectures should be well planned and provide students with active learning opportunities.

The forth category is “atmosphere/environment”. There were five studies (Kaya et al., 2011; Mangena and Chabeli, 2005; Myrick, 2002; Myrick and Yonge, 2004; Raymond and Profetto-McGrath, 2005) considered the learning environment and atmosphere to be influential factors. The studies revealed that a positive learning environment and atmosphere that facilitate students’ CT should be culturally non-threatening, encouraging, and safe and free for discussion and expressing thoughts. Myrick’s (2002) study revealed that being accepted by staff during clinical wards had a positive influence on students’ CT.

Strategies to Promote Critical Thinking

Thirteen studies provided suggestions and interventions for promoting CT in nursing education, including (i) questioning, (ii) reflective writing, (iii) case-based interventions, and (iv) others.

Four studies explained that educator participants believed questioning could stimulate students to think critically (Jenkins, 2011; Myrick, 2002; Raymond and Profetto-McGrath, 2005; Twibell et al., 2005). The adopted questioning methods could be Socratic questioning, asking multiple questions rather than one, or asking from lower level to higher level questions.

Reflective writing was valued as a useful strategy in six studies (Callister et al., 2009; Jenkins, 2011; Kaya et al., 2011; Mun, 2010; Twibell et al., 2005). Student journaling or writing narratives with appropriate guidelines and questions were shown to have a positive influence on CT skill. Mun (2010) showed that as writing narratives could allow educators to understand students’ difficulties and thoughts, the approach helps them to identify students’ CT contexts and develop appropriate strategies or suggestions.

Six studies used or suggested that case-based interventions could uplift students’ CT; such interventions include simulation (Jenkins, 2011; Kaddoura, 2010; Rush et al., 2008), clinical conferences (Jenkins, 2011; Twibell et al., 2005) and case studies/the case method (Hofsten et al., 2010; Jenkins, 2011). These interventions usually involve asking students to solve problems in given scenarios or cases.

In addition to questioning, reflective writing, and case-based interventions, there are other suggestions of strategies to promote CT. These strategies included good preceptorship experience (Myrick, 2002; Myrick and Yonge, 2004), an art-based workshop (Casey, 2009), and concept maps (Hicks-Moore and Pastirik, 2006). Based on the above findings, the nursing curriculum is striving hard to develop interventions to maximise students’ CT.

Discussion

Most of the studies were conducted in western countries. Only two explored Asian educators’ perspectives in CT, and none interviewed Asian students. The educators in Japan and Thailand pointed out obstacles and gave unique points of view that were not mentioned in the western studies, such as Japanese values regarding the traditional system of seniority and avoidance of conflict, whereas Thai educators viewed happiness as an important component of critical thinkers. More qualitative studies should be conducted in Asian countries so as to acquire an understanding of cultural differences and a more global understanding of CT. There is a need for a worldwide perspective, as such information could enable educators and students to be more aware of cultural diversity and the many faces of CT. With a better knowing of CT, educators and faculties could have a better grasp on developing strategies and interventions to improve students’ CT and prepare them for future clinical practice.

Although the American Philosophical Association (Facione, 1990) developed a definition statement for CT and characterised how ideal critical thinkers should act, nursing studies exploring the concept of CT in nurses, nursing scholars, educators and students give a variety of definitions and terms (Brunt, 2005; Simpson and Courtney, 2002; Turner, 2005). Besides this definition, the components of being a critical thinker were also perceived differently. Some commonalities, such as being analytical, evaluative, and investigative, were recognised and supported by research as the core components of CT. However, new perspectives were explored in recent studies, for example staying calm and happy was suggested as a component in one of the studies we included (Jenkins, 2011). The author believed that the relationship between CT and the two components should be further explored to seek evidence. Such results indicate that the CT concept in nursing education is still changing and improving. The concept of CT may continue to be consolidated and a more comprehensive concept be developed in the future due to ongoing changes in nursing trends and the nursing education system. Therefore, Turner (2005) suggested that a boundary delineation of the concept be considered for CT maturity, a universal definition, and to avoid confusion.

Relevant review studies focused on the efficacy of teaching strategies and interventions, but influential factors in teaching and learning CT were not reviewed. According to Suliman and Halabi (2007), students’ self-esteem and state anxiety may affect their enhancement of CT. Although it is important to examine strategies, barriers and facilitators should also be explored in order to address students’ needs and improve CT teaching and learning. This review identified four influential factors: students, educators, the education system and the atmosphere/environment. A number of studies suggested that the cultural background and attitude of the learners and educators play an important role in the implication of CT in nursing education. Undoubtedly, educators are pivotal in teaching CT and assessing students’ application of CT. Therefore, they should be knowledgeable and skilled in the area. However, Mundy and Denham (2008) highlighted the considerable variation of CT skills

and ability among nursing educators. Many educators were confused regarding thinking skills due to the lack of a clear definition and being misunderstood. Furthermore, Zygmunt and Schaefer (2006) showed that even nursing educators demonstrating a high degree of CT may not have mastered the ability to maximise students' CT. Therefore, besides enhancing and developing teaching strategies for students, the nursing education sector should consider educators' ability and support a strategy for faculty development (Mundy and Denham, 2008). In addition, educators should sometimes view themselves as "learners" in CT. They should listen, value and learn students' point of view and give students the freedom to express and question, as well as developing a harm-free teaching and learning environment.

Several reviews on teaching strategies and interventions were retrieved (Simpson and Courtney, 2002; Staib, 2003; Thompson and Stapley, 2011; Worrell and Profetto-McGrath, 2007; Yuan et al., 2008). Most of the strategies and interventions in this paper are also illustrated in these reviews, including problem-based learning, reflective writing, simulation, concept maps, and case studies. Potential interventions that are not mentioned in this paper are computer-assisted instruction, changing the delivery technique through using e-mail (Staib, 2003) and "group dynamic sessions" (Thompson and Stapley, 2011). By contrast, this review uncovered new suggestions: art-based, questioning, cross-cultural nursing experience, and good preceptorship experience. From the above teaching methods, it is clear that the nursing education faculty is striving hard to integrate CT and improve students' CT skills.

Conclusions

This project reviewed 17 studies relevant to CT development in nursing students. From the three themes that emerged from this review, one can see that the criteria for being a critical thinker are changing/have changed. Further, the definition and concept of critical thinking are perceived differently among educators. Generally put, the various components of CT included (i) gathering and seeking information, (ii) questioning and investigating, (iii) analysis, evaluation, and inference, and (iv) problem solving and application of theory. These findings were consistent with Scheffer and Rubenfield (2000), who suggested 11 affective components and 7 cognitive skills of CT. The factors influencing the development of CT in nursing education are students, educator, education system, and atmosphere/environment. A majority of the selected articles provided suggestions and interventions for promoting CT in nursing education, such as questioning, reflective writing, case-based interventions, and other teaching innovations. According to the articles, confusing perspectives and poor knowledge of critical thinking on the part of nursing educators present a threat, as such educators may lack the ability to teach CT and measure students' outcome. In addition, self-esteem and state anxiety may influence the learning of CT (Suliman and Halabi, 2007). Although it is essential to develop strategies and interventions to enhance students' CT development, it is equally important to improve educators' CT competence. Since this study did not evaluate the efficacy of various new teaching strategies and to explore more potentially valuable teaching methods, further research should be conducted in this aspect. Teaching CT to nursing students is essential and should be started early, as this cognitive skill allows them to achieve better clinical performance and improve patients' health outcomes.

Acknowledgements

This research received financial support from The Hong Kong Polytechnic University (project code: A-PM14).

References

- Brunt, B.A., 2005. Critical thinking in nursing: an integrated review. *Journal of Continuing Education in Nursing* 36 (2), 60–67.
- Callister, L.C., Luthy, K.E., Thompson, P., Memmott, R.J., 2009. Ethical reasoning in baccalaureate nursing students. *Nursing Ethics* 16 (4), 499–510.
- Casey, B., 2009. Arts-based inquiry in nursing education. *Contemporary Nurse* 32 (1–2), 69–82.
- Castledine, G., 2010. Critical thinking is crucial. *The British Journal of Nursing* 19 (4), 271.
- Chang, M.J., Chang, Y.J., Kuo, S.H., Yang, Y.H., Chou, F.H., 2011. Relationships between critical thinking ability and nursing competence in clinical nurses. *Journal of Clinical Nursing* 20 (21–22), 3224–3232.
- Di Vito-Thomas, P., 2005. Nursing student stories on learning how to think like a nurse. *Nurse Educator* 30 (3), 133–136.
- Facione, P.A., 1990. *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*. California Academic Press, Millbrae, CA.
- Hicks-Moore, S.L., Pastirk, P.J., 2006. Evaluating critical thinking in clinical concept maps: a pilot study. *International Journal of Nursing Education Scholarship* 3 (1) (art. no. 27).
- Hofsten, A., Gustafsson, C., Högström, E., 2010. Case seminars open doors to deeper understanding – nursing students' experiences of learning. *Nurse Education Today* 30 (6), 533–538.
- Jenkins, S.D., 2011. Cross-cultural perspectives on critical thinking. *The Journal of Nursing Education* 50 (5), 268–274.
- Kaddour, M.A., 2010. New graduate nurses' perceptions of the effects of clinical simulation on their critical thinking, learning, and confidence. *Journal of Continuing Education in Nursing* 41 (11), 506–516.
- Kawashima, A., 2003. Critical thinking integration into nursing education and practice in Japan: views on its reception from foreign-trained Japanese nursing educators. *Contemporary Nurse* 15 (3), 199–208.
- Kaya, H., Şen, H., Keçeci, A., 2011. Critical thinking in nursing education: anatomy of a course. *New Educational Review* 23 (1), 159–173.
- Mangena, A., Chabelli, M.M., 2005. Strategies to overcome obstacles in the facilitation of critical thinking in nursing education. *Nurse Education Today* 25 (4), 291–298.
- Mun, M.S., 2010. An analysis of narratives to identify critical thinking contexts in psychiatric clinical practice. *International Journal of Nursing Practice* 16 (1), 75–80.
- Mundy, K., Denham, S.A., 2008. Nurse educators still challenged by critical thinking. *Teaching and Learning in Nursing* 3 (3), 94–99.
- Myrick, F., 2002. Preceptorship and critical thinking in nursing education. *The Journal of Nursing Education* 41 (4), 154–164.
- Myrick, F., Yonge, O., 2004. Enhancing critical thinking in the preceptorship experience in nursing education. *Journal of Advanced Nursing* 45 (4), 371–380.
- Profetto-McGrath, J., 2005. Critical thinking and evidence-based practice. *Journal of Professional Nursing* 21 (6), 364–371.
- Public Health Resource Unit, 2009. *Critical Appraisal Tool for Qualitative Studies*. Retrieved 13 July 2012, from <http://www.sph.nhs.uk/sph-files/S.Reviews%20Appraisal%20Tool.pdf>.
- Raymond, C.L., Profetto-McGrath, J., 2005. Nurse educators' critical thinking: reflection and measurement. *Nurse Education in Practice* 5 (4), 209–217.
- Rush, K.L., Dyches, C.E., Waldrop, S., Davis, A., 2008. Critical thinking among RN-to-BSN distance students participating in human patient simulation. *The Journal of Nursing Education* 47 (11), 501–507.
- Scheffer, B.K., Rubenfield, M.C., 2000. A consensus statement on critical thinking in nursing. *The Journal of Nursing Education* 39 (8), 352–359.
- Simpson, E., Courtney, M., 2002. Critical thinking in nursing education: literature review. *International Journal of Nursing Practice* 8 (2), 89–98.
- Staib, S., 2003. Teaching and measuring critical thinking. *The Journal of Nursing Education* 42 (11), 498–508.
- Suliman, W.A., Halabi, J., 2007. Critical thinking, self-esteem, and state anxiety of nursing students. *Nursing Education Today* 27 (2), 162–168.
- Thompson, C., Stapley, S., 2011. Do educational interventions improve nurses' clinical decision making and judgement? A systematic review. *International Journal of Nursing Studies* 48 (7), 881–893.
- Turner, P., 2005. Critical thinking in nursing education and practice as defined in the literature. *Nursing Education Perspectives* 26 (5), 272–277.
- Twibell, R., Ryan, M., Hermiz, M., 2005. Faculty perceptions of critical thinking in student clinical experiences. *The Journal of Nursing Education* 44 (2), 71–79.
- Walthew, P.J., 2004. Conceptions of critical thinking held by nurse educators. *The Journal of Nursing Education* 43 (9), 408–411.
- Worrell, J.A., Profetto-McGrath, J., 2007. Critical thinking as an outcome of context-based learning among post RN students: a literature review. *Nurse Education Today* 27 (5), 420–426.
- Yuan, H., Williams, B.A., Fan, L., 2008. A systematic review of selected evidence on developing nursing students' critical thinking through problem-based learning. *Nurse Education Today* 28 (6), 657–663.
- Zori, S., Nosek, L.J., Musil, C.M., 2010. Critical thinking of nurse managers related to staff RNs' perceptions of the practice environment. *Journal of Nursing Scholarship* 42 (3), 305–313.
- Zygmunt, D.M., Schaefer, K.M., 2006. Assessing the critical thinking skills of faculty: what do the findings mean for nursing education? *Nursing Education Perspectives* 27 (5), 260–268.