



## An information communication technology based approach for the acquisition of critical thinking skills

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### SUMMARY

**Background:** Both academics and practitioners agree that critical thinking skills are necessary to provide safe and comprehensive nursing care. In order to promote the development of critical thinking, nurse educators need to keep the teaching/learning process captivating and interesting using active learning environments. These can be implemented by using modern information and communication technologies that are simple, fun, and time and cost effective.

**Objectives:** The goal of our study was to design and test an approach, which allows individual and fast acquisition of critical thinking skills with the use of information and communication technology.

**Design:** A combination of qualitative and quantitative research design was implemented. The study consisted of a quasi-experiment (phases 1–3): (1) pre-test discussion board, (2) use of e-contents based on the presented approach, and (3) post-test discussion board. The participants' opinion about the presented approach was identified in phase 4.

**Settings:** The study was performed in May 2012 during the course “Ethics and Philosophy in Nursing” at the Faculty of Health Sciences, University of Primorska, Slovenia.

**Participants:** Forty first-year undergraduate nursing students.

**Methods:** Qualitative analysis of the discussion boards (phases 1, 3) and an anonymous survey with open- and closed-ended questions (phase 4).

**Results:** Qualitative analysis of the discussion boards showed a significant ( $p < 0.001$ ) improvement in the percentage of posts (12.2%) for which the opinions and conclusions of the participants were justified with valid arguments. The survey results indicated that participants perceived the e-contents based on the presented approach as useful, and that they improved their critical thinking skills.

**Conclusions:** Repeated confirmation of the validity of the presented approach through methodological triangulation represents a strong indication that the presented approach is a valuable tool to develop nursing students' critical thinking skills.

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### Introduction

Nurses need to deal effectively with complex change, increased demands and greater accountability. Critical thinking (CT) contains core elements like analysis, inference, interpretation, explanation, evaluation, and self-regulation (Facione and Facione, 1994; Facione et al., 1990). These are important for the development of CT skills, which nurses require to perform their daily functions in practice (Chabeli, 2010). Besides, CT skills are necessary to provide safe and comprehensive nursing care (Popil, 2011) and are also required to deliberate effectively about ethical issues in personal and professional life (Matchett, 2009). Therefore, nurses must become skilled in higher

level thinking and reasoning abilities (Simpson and Courtney, 2002), which underlines the importance of CT in nursing as shared by both academics and practitioners.

Among the many challenges that nurse educators face today is the need to keep the teaching/learning process captivating and interesting (Royse and Newton, 2007). Hence, Royse and Newton (2007) suggest the use of active learning environments that promote active involvement. Paul (1990, p.45) states that it is important for nurse educators to simply “abandon methods that make students passive recipients of information and adopt those that transform them into active participants in their own intellectual growth”. However, CT is not a method to be learned, but rather a process, an orientation of the mind, and thus will be more demanding and includes both the cognitive and affective domains of reasoning (Simpson and Courtney, 2002).

The aim of this paper is to promote the acquisition of CT skills. Several scholars suggest the use of different approaches for the acquisition

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of CT skills in nursing using various forms of information and communication technology (ICT).

## Background

In order to provide sufficient background we undertook a thematic review of relevant sources (books, journal articles and websites), using different databases and search engines (e.g. ScienceDirect, ProQuest, Google Scholar, Google). We focused our search on different combinations of keywords: teaching, learning, nursing, approach, CT, strategy, method, ICT, internet, web, and interactive. In reviewing the literature, various approaches and strategies are offered to promote and affect CT skills in nursing like: questioning, role-play, case studies, simulations, writing and reading assignments, gaming, small group activity or interaction, debate, journaling, and problem solving/problem-based learning (Simpson and Courtney, 2002). The common denominator of the reviewed ICT papers is the transfer of these traditional approaches and strategies in web-based online virtual learning environments that meet the needs of the busy lives of the individual users (Alberts, 2004).

Early use of ICT-based approaches to acquire CT skills was geared towards asynchronous communication options (Alberts, 2004). For example, asynchronous discussion boards have been used successfully as online versions of traditional approaches and strategies that included online writing and reading assignments and online self-directed or mentored journaling. As such these promote active learning behaviour, positively affect the student learning outcomes (Wang, 2010; Williams and Lahman, 2011), and encourage the use of CT (Arend, 2009). Numerous researches evaluate the effectiveness of these strategies and show that ICT-based strategies facilitate the acquisition of CT skills (Carter and Rukholm, 2008; Carter et al., 2006; Daroszewski et al., 2004; Posey and Pintz, 2006).

Other common characteristics identified from the reviewed papers were: a central and active part for the student (Lai and Wu, 2012), innovative ways of providing information, and promoting learner-centred knowledge (Carifa and Janiszewski Goodin, 2011). These so-called learner-centred approaches focus on facilitating the learners' learning, rather than the teacher's teaching (Carifa and Janiszewski Goodin, 2011; Chiang et al., 2010; Lai and Wu, 2012). This contrasts to the traditional teacher-centred education, where learners are passive recipients of knowledge and the faculty transmits it one-directionally (Chiang et al., 2010).

Advances in ICT (Web 2.0 technology) have opened opportunities for online learning by interactivity (Baid and Lambert, 2010). This meets the learning needs of today's generation of students allowing them to control their own learning (Hogan et al., 2011). More importantly, interactivity is perceived to be a driver for CT (Saadé et al., 2012), as it offers an opportunity to explore innovative pedagogical solutions that help students develop CT skills in a safe environment (Petit dit Dariel et al., 2013) with real-life practical problems (Kaddoura, 2010). Learner-centred, interactive approaches and strategies like (web-based) educational simulations (Garrett and Callear, 2001; Kaddoura, 2010; Salleh et al., 2012) and even recreational games and interactive exercises (Boctor, 2013; Bruning, 2005; Carifa and Janiszewski Goodin, 2011; Hogan et al., 2011; Peddle, 2011) allow nursing students to individually learn complex novel ways of thinking (Carter and Rukholm, 2008). This type of learning environments more effectively bridge theory and application (Carifa and Janiszewski Goodin, 2011), encourage students to make connections between previous concepts and new knowledge, and facilitate reflection on their actual practical work (Lai and Wu, 2012). Furthermore, these strategies can simulate real scenario clinical practice. Thus students can gain experience, rehearse situations and how to approach problems, formulate thinking, participate in discussions, and solve problems (Burns et al., 2010; Carifa and Janiszewski Goodin, 2011; Yeh and Chen, 2005). A non-destructive environment that can be practised repeatedly for problem

solving and decision making in simulated scenarios is crucial for nursing education, since nursing students can take the time for reflection without endangering patients (Yeh and Chen, 2005; Yildirim et al., 2011).

ICT-based approaches for the acquisition of CT skills that are learner-centred and interactive can be time consuming to develop and costly to produce (Carifa and Janiszewski Goodin, 2011; Peddle, 2011). The challenge is to make them time and cost effective, simple, fun (Baid and Lambert, 2010), and educational (Boctor, 2013; Carifa and Janiszewski Goodin, 2011; Peddle, 2011), besides having them live up to the needs of the technologically experienced students of today (Baid and Lambert, 2010; Boctor, 2013; Burns et al., 2010).

The goal of our study was to design and test the effectiveness of an ICT-based modern approach for the acquisition of nursing students' CT skills that: is attractive, is easy to use, requires the active involvement of students, and allows individual and fast acquisition of CT skills.

The main research questions of our study were: (R1) will the presented approach be accepted as educational material by the nursing students?, (R2) will the presented approach be perceived as effective for developing CT skills?, and besides (R3) will the presented approach improve their CT skills?

## Methods

To answer the aforementioned research questions a combination of qualitative and quantitative research design was implemented. The study was performed in May 2012 during the course "Ethics and Philosophy in Nursing" at the Faculty of Health Sciences, University of Primorska, Slovenia. Request for approval was sent to the ethical commission of the institution and the management board, which both approved. The students were invited to participate in the study seven days in advance and received information about the purpose of the study, the potential benefits and harms, the data collection procedures, the time commitment, voluntary participation, the right to withdraw (without prejudice to care), assurance of confidentiality (including in study publication), contact details of the researchers, and an offer to answer any questions related to the study.

A quasi-experimental time series design was used as it facilitated pre- and post-testing of the study's participants. In the final survey participants expressed their personal opinion about the e-contents based on the presented approach. The study consisted of four phases, lasting 1 h each: (1) Participation in pre-test discussion board in which all participants were introduced to ethical situations, which they had to discuss; (2) use of the e-contents based on the presented approach; (3) participation in post-test discussion board (similarly as in phase 1, but different ethical situations); and finally (4) an anonymous survey in which participants could express their opinion about the presented e-contents. In order to gain reliability, all four phases were implemented in a computer classroom, during which time two researchers were present for clarifications.

## Instruments

The study was implemented with the use of the e-learning management system Moodle. Three e-contents based on the presented approach were developed. All the situations and the parts of scenarios were implemented as comic strips. The web application BitStrips (Bitstrips – Comics starring YOU and your Friends, n.d.) was used to create different characters, situations and objects in order to make the situation more vivid. Strips were integrated into e-learning contents by using the e-learning authoring tool CourseLab 2.4 (CourseLab – Main Page, n.d.).

The questionnaire consisted of three sections: (1) basic demographic questions (gender, age); (2) three open-ended questions,

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