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Developing college students' critical thinking through reflective writing

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ABSTRACT

Critical-thinking skills are a desired higher education outcome and a primary goal in education. This research focuses on fostering college students' critical thinking through reflective writing. During an 18-week study, a total of 60 English majors were recruited. Both quantitative and qualitative data was collected, including 1) the pre- and post-tests of the 5-point Likert scale Reflection Questionnaire, and 2) nine students' reflective essays. The results showed that students significantly improved their critical thinking and revealed four prevalent changes. More specifically, self-worth and volunteerism (two major conceptual changes), as well as patience and gratefulness (two key behavioral changes) stood out among these changes. The implications of using reflective writing to promote students' critical thinking are discussed.

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Introduction

Critical thinking (CT) is an integral skill for problem-solving and decision-making in higher education (Liu et al., 2018; Lu & Xie, 2019). Higher-order thinking is required if students are to successfully navigate the twenty-first century to critically analyze and support their assertions (Fahim & Masouleh, 2012). Over the last two decades, Taiwan has expanded its capacity for higher education, which culminated in a net enrollment of over 70% in the 18–21-year-old age group (Huang & Hsu, 2021). This outcome resulted from the country's commitment to nurture young talent and prioritize high-quality human resources. With the effective implementation of general education platforms, students are especially encouraged to acquire 'critical-thinking skills and wisdom, ways of knowing and doing, and life-long learning attitudes and skills' (Huang & Hsu, 2021, p. 257). Research into areas that advance this objective is therefore significant given the need to keep abreast of educational trends for inbound and outbound student mobility and national development. Therefore, it is vital to assist students in embracing critical-thinking and metacognition skills that lead to personal, intellectual,

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and professional development (Fahim & Masouleh, 2012; Ramlal & Augustin, 2020). To this end, the role of educators and their ability to motivate students' dispositions to develop their critical-thinking skills is paramount (Ryan, 2013).

In most Asian countries, sociocultural factors are attributed to the underdevelopment of critical and creative learning abilities (Floyd, 2011; Lee et al., 2015). Researchers often highlight the difference between Western and Eastern educational systems, attributing the proclivity for rote learning and passive interactions to Confucianism (Chiu, 2009; Lee et al., 2015). Confucian values in Asian societies have a close relationship with social harmony, conflict avoidance, obedience to teaching authority (Chiu, 2009), and benevolence (Guo et al., 2021). Some of the criticism is ascribed to educators' desires for favorable high test scores (Tseng, 2020), and their tendency to direct students on what to think instead of *how* to think (Reece, 2002). In addition, Asia's educational systems' over-emphasis on intensive standardized testing and teacher-dominated instruction is slowly being transformed. The Taiwan governments' 2002 revised curriculum (Ministry of Education, Taiwan, 2002) and Singaporean programs such as 'Thinking Schools, Learning Nations' (Saravanan, 2005) are concrete examples of this transformation. These pathways value critical thinking, such as probing the facts, public questioning of authority figures, and interacting with instructors and peers. Critical thinking is a key objective of national policies and curricula of many contemporary education systems (Halx & Reybold, 2005). To capitalize on this shift, students need to be taught 'how to reflect in deep and transformative ways' (Ryan, 2013, p. 212). However, teacher training in active learning, and how to develop CT among students, is uncommon in Taiwan (Yang, 2012). Most teacher training in Taiwan strongly emphasizes the acquisition of content knowledge in traditional subjects such as English or Math, but rarely focuses on reflective skills; hence, there is a reluctance to integrate CT instruction into classes (Chan et al., 2020). This study seeks to bridge this gap by engaging students in a CT instructional design. This design uses reflective essay writing to enhance students' CT abilities, and to teach students to value the importance of altruism, humanitarianism and good social practices, etc.

Models of intelligence

A paradigm shift in Taiwan's pedagogical structures is needed to validate critical-thinking skills given its applicability to diverse disciplines to develop learners' inquisitiveness, creativity, problem-solving abilities, and independence (Fahim & Masouleh, 2012; Lee et al., 2015). Several models of intelligence have been incorporated into learning models in education. Educators such as Mezirow (1998) and Gardner (1992) are credited with critical-reflection and multiple intelligences, respectively. Both educators have emphasized the importance of students' critical thinking skills. Their work encourages students to successfully participate in classroom learning and to think critically. Through critical reflection, reflective journal writing, and reading, students are able to address personal obstacles and implement transformative learning strategies in the classroom (Dyment & O'Connell, 2010; Farahian et al., 2021).

Previous studies have identified at least six ways in which reflective writing in higher education can enhance students' critical thinking (Naber & Wyatt, 2014). These include basic recall of facts and knowledge to actively analyze knowledge in different

environments (Connor-Greene, 2000), foster understanding and application of concepts (Connor-Greene, 2000), encourage students to identify problems and seek solutions (Dunlap, 2006), sharpen learning by linking theory and practice, and engage students in higher-order ideas (Connor-Greene, 2000). There are only a few empirical studies, arguably, on the use of reflective writing to improve students' CT. Naber and Wyatt (2014) contend that while previous studies often used reflective writing as a pedagogical strategy to sharpen students' reasoning and analysis, 'there is little empirical evidence regarding this strategy's effectiveness in increasing critical reflection skills' (p. 68). In an earlier case study, McGuire et al. (2009) demonstrated that reflective writing increased students' reasoning and analytical abilities but provided little empirical evidence on how this enhanced students' CT in relation to conceptual and behavioral changes.

However, there is only limited evidence that shows to what extent students make improvements in their CT performance, and what conceptual and behavioral changes can be revealed while developing CT through reflective writing. Thus, more studies are needed to explore this area further. To address these issues, this research uses a quantitative method to assess students' CT performance and a qualitative method to probe their CT levels and prevalent changes by analyzing their reflective essays. The following research questions will guide the study:

Research Question 1. Do students improve their level of CT performance through reflective writing?

Research Question 2. What conceptual and behavioral development can be characterized from reflective writing?

Materials and methods

Methods

This study adopted a mixed method approach to assess students' CT performance, and to reveal the prevalent changes found in their reflective essays. To assist students in improving their CT performance, reflective writing served as a crucial tool in achieving this aim. Kember et al.'s (2000) Reflection Questionnaire was administered and analyzed using a paired sample *t*-test to measure changes in students' CT. Writing prompts were provided to students, and their reflective essays were analyzed using content analysis.

Participants

Participants consisted of 60 third-year Taiwanese university students majoring in English enrolled in a two-credit course entitled 'Professional Ethics'. The course was taught in English, two hours per week for 18 weeks. The group comprised 12 males and 48 females between the ages of 20 and 22 years ($M = 20$). The criteria set was based on inclusion. All volunteer participants submitted signed informed consents and were informed of their right not to participate in any phase of the study. The university granted ethical approval. A post hoc power analysis revealed that based on the mean, and effect size ($d = .47$), approximately $N = 60$ would provide statistical power at the recommended 0.80 level (Cohen, 1988).

Course design and materials

The course *Professional Ethics* was designed to teach altruism through a method called Observe Merits and Appreciate Kindness (OMAK). OMAK promotes positive thinking and helps students to find their true calling. The curriculum sought to help students find meaning and satisfaction in acts of altruism, enable them to practice OMAK, and empower them to find a calling and purpose in life. For the entire semester, instructional activities included lectures, panel discussions, and voluntary services. Lectures presented notions like purpose, gratitude, sustainability, and altruism. Panel discussions involved social enterprise, enterprise and environmental sustainability, international education and workforce, harmonious workplace relationships, materialism and spiritualism, etc. The activities included voluntary work at a local farm, voluntary teaching at a local elementary school, volunteer work with stray dogs and cats, as well as other social services to engage students to experience learning through hands-on practice. Through the above lectures, panel discussions and volunteer work, students can turn abstract concepts into real-life practical experience. All lectures and panel discussions were delivered by two teachers using PowerPoint instruction and included writing worksheets as well as reflective essays.

There were eight panel discussions on various humanitarian topics and subtopics, such as social enterprise, enterprise and environmental sustainability, altruism in the workplace, materialism and spiritualism, etc. These topics provided students with the opportunity to deepen their understanding of the concepts learned in the lectures through thought-provoking discussions. Bucy (2006) noted panel discussions enabled students to achieve better CT performance through high student-to-student interaction. Before the panel discussions, participants were divided into eight groups (moderator = 1; panelist = 4; audience = 3). During the panel discussion, the moderator facilitated healthy discussions; the four panelists gave multidimensional perspectives on the selected topics, and the audience directed questions and comments to the panelists. At the end of each day, all student participants composed a reflective essay based on the panel discussion. As a result, through participating in voluntary work, students were able to connect professional concepts from the lecture to real-life practice (Dewey, 1938), which in turn allowed them to reflect on their real-life experiences.

Instruments

Reflection questionnaire

This study adapted Kember et al.'s (2000) 16-item four-scale reflection questionnaire to measure four constructs:

- Habitual action (HA) – routine situations or automatic activities
- Understanding (U) – a person's comprehension of a concept or phenomenon without reflecting on it or relating it to personal experiences
- Reflection (R) – reflection on previous thoughts or actions, and
- Critical thinking (CT) – the highest level of reflective thinking and refers to thoughts that lead to changes in prior perceptions or ways of doing things.

The reflection questionnaire elicited responses on a five-point Likert scale, ranging from 5 = *strongly agree* to 1 = *strongly disagree* (see Appendix A). The four constructs

were used as an analytical framework to gain better insights into student participants' CT performance in their reflective essays (Research Question 2).

Cronbach's alphas for the four constructs were found to be reliable at: HA (0.711); U (0.825); R(0.681); and CT (0.751).

Writing prompts for reflective essays

Before composing reflective essays based on social practice and panel discussions, writing prompts were provided to guide students when writing their reflective essays. The writing prompts were presented as follows:

- (1) In what agency did you provide social services? What services did you provide? How did your services benefit others, the community, or both?
- (2) What problems did you encounter during social service? What solutions did you come up with? How did engaging in social service change you?
- (3) What skills or knowledge did you learn by providing social service? How did you apply them to your daily life?
- (4) What would you want to change about yourself? Did you change for the better because of your social service experience?
- (5) What left you with a deep impression of social service? Did it change your life for the better?

Five additional writing prompts were provided for the panel discussions:

- (6) Did you have certain ideas on the topic before the panel discussion?
- (7) Were the ideas challenged or confirmed in the panel discussion? Please explain how and why.
- (8) How did you apply what you have learned to your life? Please provide at least two examples.
- (9) What problems did you identify in today's panel discussion? Have you come up with any solutions?
- (10) Did the panel discussion of the day change or confirm your thinking or behavior? Please state the 'before' and 'after' experiences.

Data collection and analysis

Two data sources were used in this study: questionnaires and reflective essays. The questionnaire used was adapted from Kember et al. (2000) and distributed to the 60 students as a pre- and post-test, to be completed before and after the writing of their reflective essays. The reflective writing consisted of eight essays based on panel discussions, and one essay based on social practice.

To answer Research Question 1, a paired sample *t*-test was adopted to analyze students' CT improvement in pre- and post-test scores. To characterize students' prevalent changes and probe into their CT performances to answer Research Question 2, the students' reflective essays were analyzed using Patton's (2002) four stages of content analysis: coding, categorization, description, and interpretation.

Two analytical frameworks guided the content analysis: Zwart et al.'s (2007) *Indicators of Change* and Kember et al.'s (2000) *Reflective Thinking Framework*. In the first stage of coding, the researcher used indicators of change to code meaningful statements in the students' reflective essays (see Tables 1–2). The researcher read the essays repeatedly

Table 1. Indicators of change (Adapted from Zwart et al., 2007).

Coding criteria	Coding example
1. Statements regarding students' learning outcomes.	<i>I have learned that ...</i>
2. Statements concerning observations or evaluations of student learning outcomes.	<i>I observe that I ...</i>
3. Statements indicating a wish to conduct certain behaviors.	<i>I am going to be a thankful person after reflective writing.</i>
4. Statements based on comparison and contrast of events or perceptions.	<i>Reflective writing enabled me to build more self-esteem than before.</i>
5. The use of verbs that incorporate change in the students' reports of events, such as to change, modify, and gain.	<i>I changed my perception about social service after reflective writing.</i>
6. The use of change signaling adverbs in the teacher's report of events, such as before, different, and suddenly.	<i>I had not noticed my habit of impatience before.</i>

Table 2. Results of the t-test in students' pre- and post-tests.

Level	Construct	Paired differences		t	df	Sig. (Two-tailed)
		M (Pre-Post)	SD			
Low	1. Habitual action	-0.191	0.667	2.196	59	0.032*
	2. Understanding	0.076	0.397	1.474	59	0.146
	3. Reflection	0.047	0.499	0.718	59	0.476
High	4. Critical thinking	-0.297	0.636	3.584	59	0.001**

Note: $N = 60$, * $p < 0.05$, ** $p < 0.01$

and did a line-by-line analysis to elicit codes manually based on the framework. These were entered into Microsoft Word. An independent assessor reviewed these codes, and any disagreements were amicably settled.

In the categorization stage, Kember et al.'s (2000) four constructs divided students' essay excerpts into four levels. These four constructs were *habitual action (HA)*, *understanding (U)*, *reflection (R)*, and *critical thinking (CT)*. For HA, writings were related to communicated routines, procedural matters or simply described daily experiences; U encourages students' comprehension of the content without reflecting or relating to personal experience; R involves students reflecting on their previous thoughts or actions; CT is the highest level of reflective thinking that helps students learn complex judgmental skills. Students' reflective essays based on panel discussions and social practice were analyzed following the analytical frameworks described by Zwart et al. (2007) and (2000). During the description stage, the researcher proposed and summarized the main ideas of categorized statements of change in students' reflective writing. In the stage of interpretation, students' changes were coded through drawn inferences, explanations, and conclusions about the main ideas related to conceptual and behavioral changes as documented in the reflective essays (Research Question 2) (see Table 3). To indicate changes in students' writing, we used processual words (e.g., *I observe*) or noun phrases, which most often suggested CT (see Table 1). The coding examples in Table 1 show students' conceptual and behavioral changes from the lower thinking level, to the higher critical thinking level.

Table 3. Types of conceptual and behavioral changes in reflective essays ($N = 60$).

Theme	Type of changes	Prevalent theme	Number of statements	Frequency (%)
Changes	Conceptual changes	1. Increase in self-esteem 2. Voluntary service approval	94	51/60 (85) 43/60 (72)
	Behavioral changes	1. Showing more patience 2. Appreciating life more	99	53/60 (88) 46/60 (77)

Results

Research Question 1: do students improve their level of CT performance through reflective writing?

A paired sample t-test compared the results of the pre- and post-tests of students' CT performance. The four constructs represented four stratified levels of thinking as shown in Table 2. A significant difference existed in the pre- and post-tests on HA ($t = -2.196, p = .032$) and CT ($t = -3.584, p = .001$). The results indicated that the students had significantly progressed in HA and CT after the reflective writing intervention. Conversely, no significant difference was observed in the pre- and post-tests on understanding ($t = 1.474, p = .146$) and reflection ($t = .718, p = .476$). The results suggested that engaging college students in reflective writing helped to significantly improve their CT performance on the HA and CT in the reflection questionnaire.

Research Question 2: What conceptual and behavioral changes are characterized by students' reflective writing?

Two prevalent themes emerged as conceptual changes: an increase in self-esteem (85%) and voluntary service approval (72%). Table 1 shows two prevalent emergent themes as behavioral changes: showing more patience (88%) and appreciating life more (77%). Excerpts from the reflective essays of S1, S2, S3, and S4 from the four prevalent themes were selected as representative data for illustration (see Table 4).

First conceptual change: increase in self-esteem

One main objective of this study was to use reflective writing based on social service to document students' conceptual and behavioral changes. Results showed an increase in self-esteem (85%) as the most prevalent theme among the conceptual changes.

As shown in Table 5, S1 initially gave little value to the assigned clerical work, but later revised judgment of the value of the service provided and problem-solving abilities, which led to a pledge to become 'a kinder and more contributory person'. While the reflective essay documents changes in self-worth, it shows that CT levels progressed from HA in the earlier stages to reflection and CT in the later stages. Thus, reflective writing revealed how the recognition and appreciation they received for participating in social service led

Table 4. Excerpts of students' four types of changes in reflective essays.

Type of changes	Prevalent theme	Example
Conceptual changes	1. Increase in self-esteem	<i>'I had learned that our group efforts essentially addressed the staff deficiency problem. This achievement built my self-esteem.'</i> (S1)
	2. Voluntary service approval	<i>'Thank voluntary farming for enabling me to experience the hardship of farming. Thus, I changed my previous ideas about voluntary service.'</i> (S2)
Behavioral changes	1. Showing more patience	<i>'When doing voluntary teaching, I showed patience more than ever. I liked this change because it empowered me to understand others' thoughts and feelings.'</i> (S3)
	2. Appreciating life more	<i>'I had learned that my health and youth promised me a hopeful future. Therefore, I showed gratitude for everything in my life.'</i> (S4)

Table 5. Excerpts from S1’s reflective essay showing an increase in self-esteem.

Stages of S1’s reflective essay	S1’s conceptual changes excerpts in the reflective essay	Stages of S1’s CT levels
Early stage	“I thought little of my minor volunteering efforts, such as checking the donated invoice, because it was only a minor contribution to the foundation.”	HA (Construct 1)
Writing prompts	What problems did you encounter during social service? What solution did you come up with? How did social service change you?	
Later stage	“I had learned that our group efforts essentially addressed the problem of staff deficiency. This achievement built my self-esteem and made me feel good.”	R (Construct 3)
	“With higher self-esteem, I am going to change myself into a kinder and more contributory person, like the foundation staff, in my daily life.”	CT (Construct 4)

Key: HA = Habitual action, U = Understanding, R = Reflection, CT = Critical thinking

to students’ increase in self-esteem. Second, internal motivation contributed to students’ increase in self-esteem because they wanted to emulate the staff’s contribution to society.

Second conceptual changes: voluntary service approval

Reflective writing based on voluntary service was used as a pedagogical strategy to facilitate and document changes in college students’ CT. As shown in Table 6, voluntary service approval was the second most prevalent conceptual change and accounted for 72% of the responses. For example, S2 wrote a reflective essay on helping with farm chores at an organic agriculture farm, which was devoted to promoting sustainable organic farming and providing varied experiential education activities and volunteer opportunities for the public. Excerpts from S2’s reflective essay (see Table 6) showed that a change from disapproval to the approval of voluntary service from the early to later stages showed the experience enhanced their CT levels.

Table 6 indicates that S2 initially cannot imagine the farmers’ hardships and doesn’t understand the importance of voluntary farming in the early stages due to

Table 6. Excerpts from S2's reflective essay showing voluntary service approval.

Stages of S2's concepts in the reflective essay	S2's conceptual changes excerpts in the reflective essay	Stages of S2's CT levels
Early stage	"I couldn't understand farmers' hardship because I never farmed and I simply bought fresh vegetables from markets. Thus, voluntary farming might be easy for me."	U (Construct 2)
Writing prompts	What skills or knowledge did you learn in social service? How did you apply them to your daily life?	
1. Community care	"Thank voluntary farming for enabling me to experience the hardship of farming, including insect bites, physical harms, harsh sun, etc.	CT (Construct 4)
Later stage	Thus, <u>I changed my previous ideas</u> about voluntary farming."	
2. Relationship building	" <u>Observed that</u> organic farmers here cooperated happily. They were passionate to teach me farming skills and appreciated our help. <u>I had</u>	CT (Construct 4)
3. Skill enhancement	<u>learned that</u> from them tenacity and job enjoyment were positive virtues in the	
4. Career development	workplace."	
		Improved

Key: HA = Habitual action, U = Understanding, R = Reflection, CT = Critical thinking

her inexperience in this area. In the later stage, she changed her opinion to 'appreciating' the value of voluntary farming. The reason for S2's change of opinion was that when she became a volunteer farmer, she learnt the meaning and value of the following four aspects, *community care*, *relationship building*, *skill enhancement* and *career development*. Take *community care* as an example, hands-on farming taught S2 how farmers undergo grueling labor to produce fruits and vegetables. This experience was far from her original perception of perfect-looking farming products in the

Table 7. Excerpts from S3’s reflective essay showing more patience.

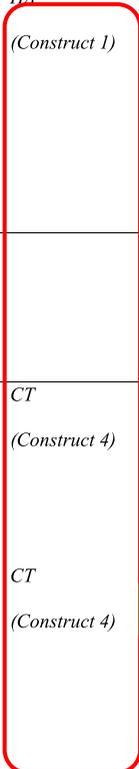
Stages of S3’s behaviors in the reflective essay	S3’s behavioral changes excerpts in the reflective essay	Stages of S3’
Early stage	“I used to be an impatient and restless person who rushed for time. I couldn’t tolerate delay and disagreement. I always reacted aggressively to it. But I want to change and improve my relationships now.”	HA (Construct 1)
Writing prompts	What would you want to change about yourself? Did you change for the better after the social service?	
Later stage	“I observed that I showed more patience after the voluntary teaching. For example, I listened more patiently to my group members, expressed myself properly in the group discussion, and interacted patiently with the kids.” “I liked <u>my change of showing more patience</u> . By doing so, I could fully understand the thoughts and feelings of my peers and students, and enjoyed interacting with them.”	CT (Construct 4) CT (Construct 4)

Patient actions

Patient actions

Positive effects of showing patience

Positive effects of showing patience



Improved

Note: HA = Habitual action, U = Understanding, R = Reflection, CT = Critical thinking

supermarkets. With regards to *relationship building*, S2 experienced and enjoyed the friendly working environment in the foundation. In *skill enhancement*, foundation farmers were willing to teach S2 some basic farming skills that she hadn’t learned before. Finally, in relation to career development, S2 thought that the ‘diligence and passion’ of the foundation farmers were admirable characteristics of productive workers in the workplace, and she desired to cultivate both. While S2 reported her learning in these four aspects, her reflective essay excerpts reveal that she improved her critical thinking levels from *understanding (U)* (construct 2) in the earlier stage to *critical thinking (CT)* (construct 4) in the later stage. It was evident that engaging people in voluntary service is an effective method of helping them to appreciate the value of hard work. Furthermore, it allows them to appreciate and enjoy the positive aspects of learning.

Table 8. Excerpts from S4’s reflective essay showing appreciating life more.

<i>Stages of S4’s behaviors in the reflective essay</i>	<i>S4’s behavioral changes excerpts in the reflective essay</i>	<i>Stages of S4’ CT levels</i>
Early stage	“My friends and I used to complain about everything not going our way, such as boring classes, a lack of time, etc. The habitual complaints made us unhappy because we thought there was a better way for our life.”	HA (Construct 1)
Writing prompts	What left you with a deep impression of social service? Did it change your life for the better?	
	“During an elderly home visit, <u>I observed that the</u> elder was socially isolated and diseased, which worried me a lot. This observation made me appreciate my life because <u>I had learned that my</u> health and youth promised me a hopeful future. I appreciate what I have now.”	CT (Construct 4)
Later stage	“Appreciating my health and youth encouraged me to <u>make desirable changes</u> , and so I felt happier than ever. For example, I stopped complaining; instead, I started to appreciate what I have and cherish it. Besides, I put more effort into helping others and volunteering.”	CT (Construct 4)

Appreciating life

Feeling abundant

Repaying society for

Improved

Note: HA = Habitual action, U = Understanding, R = Reflection, CT = Critical thinking

Behavioral change I: showing more patience

The most prevalent theme under behavioral changes in the reflective essays was exhibiting more patience, which approximately 88% of the students mentioned. For example, S3, a volunteer who taught English at a kindergarten, wrote a reflective essay that revealed improvements from habitual impatience and improved CT levels (see Table 7).

S3 became aware of habitual impatience and intolerance because of the kindergarten inexperience. S3 became cognizant of the need to build better social relationships and to change during voluntary teaching. There was a greater appreciation of the positive effects of being more patient with the children and in communications with group members. While the reflective essay indicated forward actions, it also showed improvements in CT levels from HA in the earlier stages to CT in the later stages.

Behavioral change II: appreciating life more

The data showed that all students, in their reflective essays, demonstrated behavioral change, which is the second most prevalent theme in this study, i.e., greater appreciation for life. After their voluntary service, 77% of the students indicated fully appreciating their lives. For example, S4 helped staff at a community organization deliver necessities to disadvantaged older adults living alone in mountainous areas. Early and later excerpts from S4's reflective writing showed that as CT levels increased, there was a change from taking everything for granted to appreciating everything in life (see [Table 8](#)).

In the early stages of volunteering, S4 expressed negative feelings through constant complaining. A growing appreciation for health and youth and the development of an interest in contributing to society and gaining benefits from this resulted in an attitudinal change (see [Table 8](#)). S4's reflective essay showed that change in perspective included a sense of abundance and generosity to others, with a progression in the CT level from HA at the beginning of the experience to CT in the later stage. S4 became a happier person with a greater appreciation of life and realized rewards from helping others.

Discussion

This research used the following questions to explore reflective thinking through the essays of 60 university students at one university in Taiwan.

Research Question 1: do students improve their level of CT performance through reflective writing?

The students' pre- and post-tests scores of the adapted reflection questionnaire showed a significant improvement in their CT performance after the reflective writing intervention, particularly in the HA and CT constructs.

This result supported Quitadamo and Kurtz's (2007) experimental study that indicated reflective writing groups significantly outperformed the non-reflective writing groups. Reflective writing coupled with OMAK demonstrates how Confucianism can positively impact CT. This study contributes to the current literature by delineating students' CT performance in HA, U, R, and CT to report the effect of reflective writing on the progression of CT performance.

Research Question 2: What conceptual and behavioral changes are characterized from students' reflective writing?

Research Question 2 delved into the continuous development of students' CT levels in the reflective essays and also into four prevalent conceptual and behavioral changes reflected in students' quality reflection. To this end, S1 to S4's reflective essays probed into the CT levels and showed prevalent changes. The findings revealed that these participants steadily improved from low to high CT levels. This supports the statistical findings from Research Question 1 and quantitative studies (Naber & Wyatt, 2014) that highlighted the positive impact of reflective writing on students' CT.

Results of the four prevalent changes in the reflective essays indicated that reflective writing empowered students to make conceptual and behavioral changes through integrating hands-on social service. This corresponds with Page and Meerabeau's (2000) findings that suggested students' reflections were linked to actions that enabled them to make changes in thinking and practice. This also aligns with Mason and Boscolo's (2000) experimental study that suggested students who wrote to learn curriculum content achieved better conceptual changes than comparison groups who did little writing. Researchers also found that reflective writing helped students contemplate past experiences and reinforced newly developed knowledge (Fellows, 1994; Mason, 2001).

The study highlighted four prevalent changes: increased self-esteem, volunteerism as conceptual change, demonstration of patience, and better appreciation of life to create behavioral changes. The results corroborated Page and Meerabeau's (2000) study on students' increased self-esteem. They observed that 'action that is disciplined by reflection may also increase faith in professional judgment and thereby self-esteem' (p. 370).

Volunteerism signaled approval. S2 transformed from opposing to approving volunteer service, motivated by the realization of community care, relationship development, skill enhancement, and career development. These four characteristics echo findings from Clary and Snyder (1999) who proposed four incentives to volunteerism. These included humanitarian value, social relationships, skill or knowledge enhancement, and career-related experience. CT provides meaningful motivation to perform voluntary service and is a determining factor in students' progress.

Students' behavioral changes, such as exercising patience, enriched the literature as it provided evidence that reflective writing, derived from volunteerism, is a powerful pedagogical strategy to learn restraint. Accordingly, it can be inferred that exhibiting patience helps with understanding and adapting, which can help students develop better social relationships and face challenges. In terms of behavioral changes, this study found students gained a better appreciation for life and this motivated a desire to repay society for this privilege and prosperity. This result was similar to Birnbaum and Friedman's (2014) study, where the authors showed grateful people had two keys to happiness: they embraced life's bounty and were generous in helping others.

Conclusion

Findings indicated that the combination of lectures, panel discussions and social practice using reflective writing assists in students' personal development and the transfer of critical-thinking skills in relation to self-worth and volunteerism. Moreover, two major conceptual changes, and two key behavioral changes, specifically patience and gratefulness, were evident. This study provided four pedagogical implications for instructors who are interested in adopting reflective writing as a pedagogical strategy and assessing the quality of students' reflection to facilitate CT in higher education. The following are recommendations: 1) reflective writing should be incorporated into the curriculum across disciplines to cultivate students' CT. This is a key component for students' academic success and career development; 2) Instructors should provide students with writing structures or prompts that empower them to think critically and broaden their perspectives in their composition of reflective essays; 3) Progress of students' CT levels, as documented in their reflections, was assessed by employing the four-construct analytical framework,

HA, U, R, and CT. However, it might be helpful if instructors thoroughly examine students' reflective essays to gain deeper insights into their thinking, and note these changes. Since reflective writing enables students to report their frustrations, achievements, events that create self-doubt, and their method of problem resolution, instructors could better understand their students by reading these reflective essays. As for the four prevalent changes highlighted in the reflective essays, the results indicate that the quality of reflections empower students to make conceptual and behavioral changes.

More work needs to be conducted in this area so there is greater harmony and understanding in the teacher–student relationship. It is recommended that future studies provide students with additional *understanding-provoking* and *reflection-provoking* writing prompts, since students didn't significantly improve on these two constructs. In this manner, reflective writing can better help students improve critical thinking performance in relation to the overall four constructs including HA, U, R, and CT.

Limitations

Limitations are expected. First, the sample size was small and concentrated on a small population within one university in Taiwan. The study could have been enriched by including participants from different majors. Consequently, the study could not be generalized. In addition, there might be the influence of a gender discrepancy of the participants as there were 48 females but only 12 males recruited. A gender bias in the sample may have influenced the results. It is recommended to have an equal number for both genders in future studies. However, qualitative studies are not designed to be generalizable but to increase understanding of a phenomenon. Second, a sample of non-Taiwanese students might have represented a wider range of effects since cultural diversity might affect students' critical thinking and development. Third, an alternative research design such as a longitudinal study might show different results since the variables could be observed for a longer duration. Fourth, future studies can provide students with additional understanding and reflection-provoking writing prompts. This is to ascertain whether students did significantly improve either in understanding or reflection constructs. Finally, the study failed to capture areas in CT and HA where no changes occurred, which creates an opportunity for future research.

Geolocation information

The study was investigated in Taiwan.

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