

# Reflective Practice to Foster Critical Thinking among Students

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## Abstract

A dynamic approach to fostering critical thinking skills has emerged in the arena of education through the integration of reflective practices. The purpose of this study was to explore the central role that reflective practice can play in promoting critical thinking. Critical thinking assists students to question and evaluate their actions. The research also emphasises the importance of reflective practice as a method of tapping into learners' experiences, challenging assumptions and critically analysing their actions. Reflective practice also provides learners with the opportunity to explore their thought processes, consider alternative perspectives and formulate informed decisions, ultimately developing critical skills. This was illustrated by a case study of 24 students enrolled in a diploma in Information Technology at a South African University of Technology. An action research methodology was employed. Action research complements the process of reflective practice because it is iterative in nature. After completing their assignments, the students were requested to fill out a reflective sheet. The collected data were subsequently subjected to content analysis for comprehensive examination and interpretation. The findings indicate that reflective practice enhances students' critical thinking skills.

**Keywords:** reflective practice, critical thinking, action research, Information Technology.

## 1. Introduction

Reflective practice (RP) has gained increasing recognition as a crucial element in promoting critical thinking among students (Yaacob et al., 2020). This research explores how RP can promote critical thinking in Human-Computer Interaction (HCI) classes. Reflective practice is not just a passive process; it is an active method that allows learners to learn from their experiences, question their assumptions, and critically evaluate their actions (Horton-Deutsch & Sherwood, 2017). By engaging in reflective learning, students can identify their strengths and weaknesses, consider different perspectives and make well-informed decisions, thus developing crucial critical thinking skills (Juklová, 2015). In the process of understanding

one's knowledge and practical actions, the concept of reflection is continually presented as a tool for learning (Loughran, 2002).

Action research (AR) has been chosen as a suitable methodology to facilitate the process of RP. The purpose of AR is to transform education by boosting educators' teaching performance and elevating the learning experience for their students (Efron & Ravid, 2019). To drive improvement in our current practices, active participation in the AR process necessitates deep self-reflection and a willingness to critically question interventions. Brydon-Miller et al. (2003) describe AR as a work in progress, and therefore, the results from the last phase (specifying learning) can be used for another iteration. The intended results of AR contribute to scientific knowledge and theory and are significant learning from outcomes that are not simply the solutions to immediate problems (Coghlan & Brannick, 2019). Active engagement in class, taking notes, and following class recordings were identified as methods to assist with the reflection process to foster critical thinking. The present study aims to examine the central role of reflective practice in fostering critical thinking in the context of HCI education.

## **2. Background**

RP is a prevailing development in the teaching and learning space. Reflecting on the situation provides the possibility to develop new understandings of practical situations, which enhances the actions to be applied (Ghaye, 2010). It also allows the students to examine their work and create a strategy for future improvements. Dors et al. (2020) view RP as a strategy for learning and not content that can be learned. Lawrence-Wilkes and Ashmore (2014) developed the Reflective Rational Enquiry model to cover the scope of reflective practice. The model came about after reviewing the literature. In critical thinking, critical reasoning and reflection are separated by the theory-practice gap. By interpreting and analysing formal knowledge, inherent knowledge and experience using a range of reflective activities, new insights are gained for independent thinking and practice (Brookfield, 1995; Dewey, 1938). By using this model, the students use the knowledge they gain during class to solve problems, make data-driven decisions and make changes in the field of education. According to Quinton and Smallbone (2010), students are empowered when they reflect on their learning achievements, which enables them to make informed decisions about adjustments that are needed to make progress in their learning. This indicates a shift where the students are in charge of their learning in the sense that they take an active role and do not wait to be told what to do. Reflection can help students gain a deeper understanding of some aspects of their experience and become better prepared for the future (Loughran, 2002). Some approaches can be applied to provide an environment conducive to learning reflection to enable students to adjust to various settings. Such approaches are associated with reflection, sustainable education and how students learn.

## **3. Methodology**

An AR methodology was employed. The methodology comprises five phases that make up the AR cycle, each as displayed below in Figure 1. AR is a method of creating knowledge that arises in a practice context and requires researchers to collaborate with practitioners (Huang, 2010). According to McNiff (2013), the purpose of engaging in AR is to create valuable knowledge that fosters sustainable well-being at the personal, societal and environmental levels. AR is carried out to enhance lecturers' teaching practices and the learning experiences of their students (Efron & Ravid, 2019). Each phase of the AR cycle is presented below.

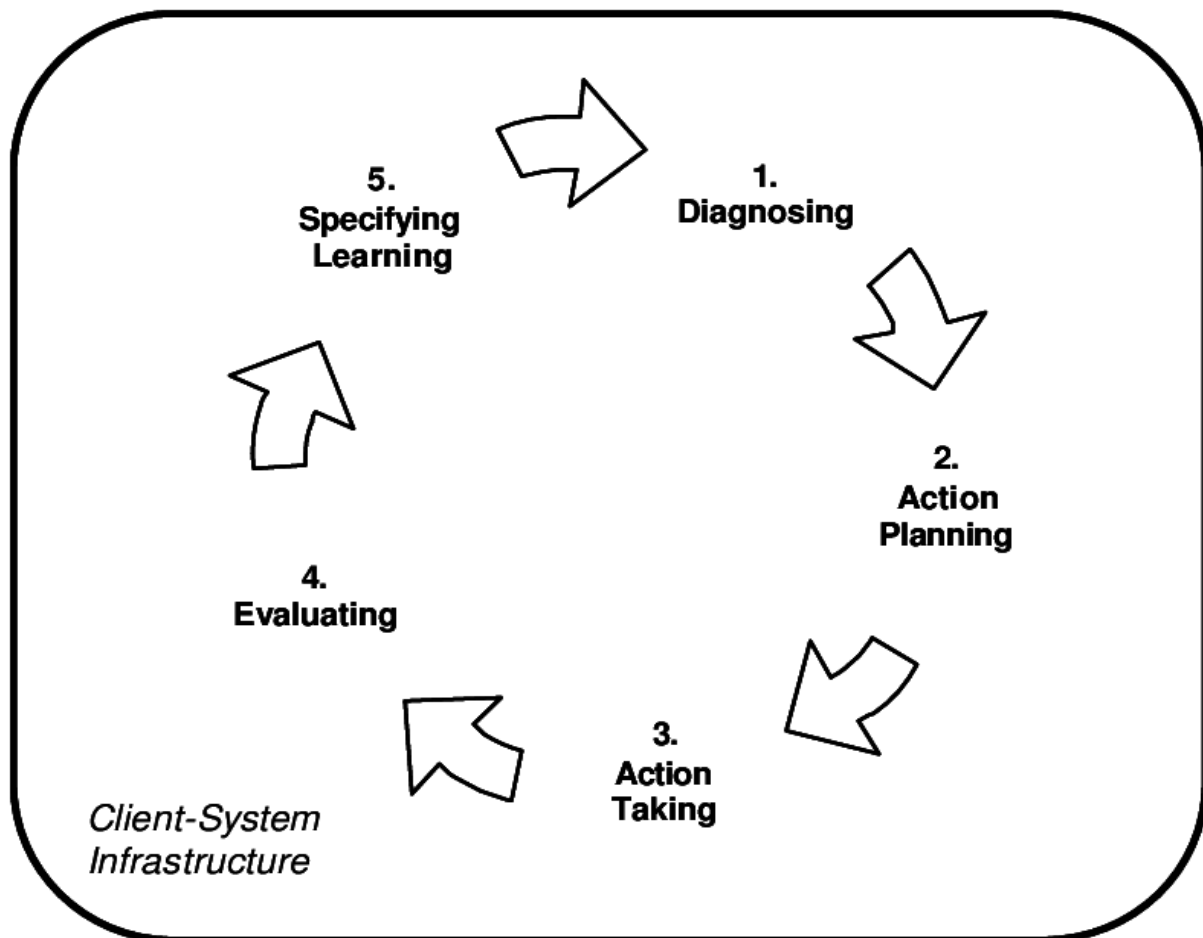


Figure 1: The AR cycle  
Adapted from Baskerville (1999)

### Diagnosis phase

The diagnosis phase intends to identify the problem experienced in the HCI classes in the context of South Africa (SA). It focuses specifically on the distinctive features of a specific population that the practice is intended to serve or requires action to be taken for (Mertler, 2024). After teaching the HCI module for several years, the researcher noticed that students were failing to apply theory to practical work: they lacked critical thinking skills. When dealing with the module's various components, they separate theory from practice. This could be one of several conceptual barriers encountered by the students. The practical work and assignment of HCI are based on applying the relevant design principles taught during theory classes.

### Action planning phase

The purpose of this phase is to implement a plan that will assist in alleviating or improving the problematic area. Possible interventions are presented in Table 1. Code AP is used to represent action plans.

**Table 1: Recommended action plans**

Code	Related literature	Recommended action plans
AP1	The work of Kolb (1984) is based on developing and testing out a theory in practice.	Design the practical task to prompt students to use the theoretical and design principles they have learned.
AP2		In the assignment, ask students to identify the principles they have used for their design.
AP3		Ask students to link theoretical content with practice by having them identify the theoretical content needed to complete practical work and incorporate reflection into their learning.
AP4	Creating prototypes for new systems is considered to be part of HCI (Bibri, 2021).	Request students to develop a prototype that represents the actual system.
AP5	The reflection process follows after students completed their work (Konak et al. , 2014).	Assign a reflection sheet or questionnaire to students that includes questions about the difficulties they experienced while completing the assignment, how they solved those difficulties, and how they would improve their work if they had additional time.
AP6		Use a reflective sheet or questionnaire to ask students to draw conclusions from their experiences and evaluate their decisions to reflect on the choices they have made.

A plan was to give the students an assignment to design a banner for the HCI module to be used on the Learning Management System (LMS). The assignment required students to specify the goals of HCI they intended to apply to their work and state the reason for their choice. The first step was to design a prototype of the logo they were planning to design using the Pencil Project software. The next step was to design a banner in line with the HCI goals they specified and the prototype they created. Thereafter, the students were requested to complete reflective sheets to reflect on their experience with the assignment they submitted.

### **Action taking phase**

For this investigation, we used a specific instructional design. We started with a theory session that covered the basic concepts of creating interactive systems and the historical background of HCI. In the second theoretical class, we presented students with the PACT framework, which assists in analysing design scenarios (Benyon, 2014). The framework involves understanding the relationship between activities and technology, the setting in which they occur, and the characteristics of the people who participate in these activities.

The theoretical classes were presented and recorded before the practical sessions took place. To make the theory class more engaging, the lecturer asked the students questions about their own experiences related to the topic. The students actively participated in this learning process, which helped them recognise that design is rooted in everyday experiences. Using this method, the lecturer gained insights into the students' backgrounds. Depending on the design section presented, different discussions were held to align with the students' existing knowledge and expectations. At the end of the presentation, the students had the opportunity to ask questions and share comments about the material covered in class. During practical classes, students were required to apply the theory they had been taught by completing a design assignment. Students were provided with a rubric to assist them in understanding how

their work would be assessed and to guide them on what they were required to do. Students were asked to submit their designs on the LMS rather than printing them. Afterwards, the students filled out a reflective sheet to ponder on their experience with the assignment they submitted. Table 2 presents the actual interventions taken during this cycle.

**Table 2: Actual Intervention**

Actual interventions	Related action plans
HCI principles were taught, and examples were made to the students on how to incorporate them into the practical work.	AP1
Lectures were recorded to allow students to access the session as needed.	None
The LMS was used for students to access module content such as class presentations, tests, assignments and classes.	None
A case study of designing a banner to use the LMS for the HCI module was provided that required the students to create a banner and demonstrate their understanding of the current work.	AP1
Students were given an assignment that required them to create a prototype.	AP4
Students were required to identify the HCI theoretical content they used in their assignment.	AP3
In the reflective sheet, students were asked to identify the theoretical work that related to the assignment they were completing.	AP3
Students were requested to complete the reflective sheets after receiving feedback on their work.	AP5

### Evaluation phase

Evaluation involves reflecting on the outcomes of the action, both intended and unintended, and reviewing the process in order to benefit from the experience for the next cycle of planning and action. Evaluation entails contemplating the consequences, whether planned or unplanned, of action, and simultaneously examining the sequence of steps for the subsequent planning phase that can be enhanced by the insights gained from the previous cycle (Coughlan & Coughlan, 2002). The empirical report will include the interventions identified in the diagnosis phase.

### Participants

The research took place at a University of Technology in SA. The students who participated in the study were enrolled in their second year of the IT program and registered for a module on HCI. Ethical clearance was obtained from the university. Participation in the study was voluntary and only 24 of 184 students (13%) who completed the assignment participated. Table 3 indicates the profiles of the participants.

**Table 3: Participants**

Ages	Gender	Participants	Repeaters	Total
19 - 23	F	<i>ptp4, ptp7, ptp9, ptp11, ptp12, ptp13, ptp15, ptp21, ptp22, ptp23</i>	<i>ptp24</i>	10
19 - 23	M	<i>ptp2, ptp3, ptp6, ptp14, ptp24</i>		5
24 - 29	F	<i>ptp5, ptp10, ptp17, ptp18, ptp20</i>	<i>ptp16</i>	6
24 - 29	M	<i>ptp8, ptp19</i>	<i>ptp1</i>	3

The participants were expected to reflect on:

- challenging parts they encountered while they were completing the assignment.
- the practicality of theoretical content during the process of completing the practical work.
- the most important lessons they have learned from the assignment they completed.
- what they would have done differently if there was more time.

### Data collection

All students were provided with a link to access the reflective sheet to reflect on their perceptions of how the theoretical sections relate to practical activities. The questions were open-ended to enable the participants to reflect on their experiences. A few broad questions were asked to determine whether the theoretical content was helpful when completing their practical projects. Participating students completed the reflective sheets after receiving feedback regarding their assignments.

### Data analysis

Conventional content analysis was used to analyse the data. Table 4 gives the summary of the process undertaken to analyse the data.

**Table 4: Content analysis process**

Process	Application in this study
1. Preparing the data	The written data was accessible for incorporation into Atlas.ti.
2. Defining the unit of analysis	Conventional content analysis was used.
3. Developing categories	Sentences that conveyed the same or similar meaning or context were classified as being related to each other.
4. Testing the coding scheme on a sample	Data from four participants was coded.
5. Coding all the text	Coding each text entailed assigning a code.
6. Assessing consistency	The coding was thoroughly reviewed twice to check for errors and necessary updates were made.
7. Drawing conclusions from the data	Several key categories have been identified and discussed.

Adapted from Zhang and Wildemuth (2009)

### Specify learning phase

During this stage, the researcher evaluated the outcomes of the intervention by reviewing the data gathered and reflecting on its significance. In the 'lessons learned' category, the question was designed to encourage participants to reflect on the most important lessons they had learned from the assignment. This question allowed the participants to highlight what they learned as a result of completing the assignment. The answers indicated that the participants not only learned about the content of the module, but also acquired skills that could be applied in other modules or at work.

**Table 5: Lessons Learned codes**

No.	Code
1.	Attend classes
2.	Understand module content
3.	Plan design first
4.	Time management
5.	Understand specifications

The lessons learned category for HCI participants can be summarised as:

- The participants realised the importance of attending the classes. *“To attend online classes”* (ptp20).
- The plan should precede the design, and asking questions is crucial for understanding the requirements. *“I have to be creative and plan before creating anything relating to website and ask myself the question before I start to create it”* (ptp04).
- There was a consensus among the participants that starting the task on time would help them avoid working under pressure. Moreover, comprehending the theoretical content would enable them to understand what needs to be done. *“To start my assignments in time and read thoroughly until I understand what to do”* (ptp14).

The significance of the participants' learning from the assignment was carefully documented, capturing various lessons about the theoretical content and practical skills acquired. In the new strategy category, participants were asked to indicate what they would have done differently if they had more time. The question was designed to encourage reflection among the participants, prompting them to think about new ideas to implement in the future by creating time for those ideas. Researching information emerged again as a strategy from the previous cycle to use if there was more time. The summary of the coded data is presented in Table 6.

**Table 6: New strategy codes**

No.	Code	Frequency
1.	Researched more	5
2.	Improve answers	5
3.	Nothing to change	5
4.	Understand theoretical content first	2

- HCI participants acknowledged that conducting research on the assigned work would have helped them understand the requirements and complete the assignment more efficiently. *“Yes, I would have taken time to research well and really gather information related to my assignment so as to make it beautiful and successful by applying everything that I have learned”* (ptp07); *“I would have done more research to understand the content and what is expected of me”* (ptp20); *“Yes, I could have done more research about the section or assignment”* (ptp02).
- They understood the importance of reading theoretical content to gain a clear understanding of what needed to be done. *“Yes, I would restart reading my notes from scratch until I understood exactly what to do”* (ptp14).

Lessons learned from this category show that participants identified specific actions they could take to improve their work.

#### **4. Discussion**

Reflections are presented for each category, beginning with the lessons learned while completing the assignment and advancing to new strategies they consider implementing in the future. The knowledge gained from these lessons can positively impact both current and future students, enhancing their study techniques. The participants discussed the techniques used to complete the assignment, highlighting both effective and ineffective methods. The skills learned during this assignment were to better manage time. Committing to a set time to work on the topic is beneficial to every student. The participants documented the lessons they learned and were able to assess their mistakes. The next section presents reflections on the new strategy category to explore other methods that could help in successfully completing the assignment. The reflections on the new strategy category reveal what the participants would have done differently if they had had more time.

Lessons learned from the new strategy category were that researching the latest information related to the topic is a great way to do an assignment, as well as engaging with other students on the current topic. As part of the strategy of starting again, students are expected to return to the beginning of their work in order to improve their performance and strategically answer questions. Starting over is a proactive technique used to gather information intentionally with the aim of improving one's grades. Using this approach helps ensure that students can excel in their studies and achieve their academic goals with satisfactory grades. Taking notes is another strategy that is mentioned to help students grasp what they are studying.

There are several approaches to taking notes. One approach involves having students review the lecture transcript post-recording and identify the most significant topics covered by the lecturer. Another effective method is for students to thoroughly review their manuals and take comprehensive notes. This approach will greatly enhance their understanding and retention of the material. The students can use both methods. Notes can be helpful during the assessment period. Students can review them and use them as a reference to recall what they learned. Students should be encouraged to review lecture recordings after class, especially if the material is challenging. They can benefit from watching lectures to enhance their skills and knowledge on the topic. They will be able to connect the topics during class discussions and assignments as a result of this.

#### **5. Conclusions**

This paper has explored the central role that reflective practice can play in promoting critical thinking among students. The data collected revealed that participants were able to critically analyse their actions. Several techniques were discussed to complete the assignment, which included both effective and ineffective approaches. The participants diligently documented the valuable lessons they learned and skillfully analysed their mistakes. The insights gleaned from the new strategy underscore the significance of conducting thorough research into the pertinent subject matter when approaching assignments. Additionally, active engagement with peers concerning current topics is an effective approach. Taking notes was identified as an approach to reviewing what was taught. An effective approach includes having students review the lecture transcript following the recording to pinpoint the most crucial topics covered by the lecturer. Encouraging students to review lecture recordings after class is essential, especially if the material is challenging.



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