

# **STUDENTS' REFLECTIVE DEVELOPMENT IN A PBL ENVIRONMENT**

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## **ABSTRACT**

This paper reports the reflective thinking processes of students at four different stages in a problem-based learning environment. A questionnaire on reflective thinking was employed, developed by Kember and associates (2000) and based on the work of Jack Mezirow, measuring different levels of reflection: habitual action, understanding, reflection, and critical reflection. It was hypothesised that students in higher years of their problem-based learning experience would demonstrate deeper levels of reflection as compared to their junior peers. The results did support the hypothesis to some extent, but an interesting pattern occurred for students after their first year, and this was discussed in light of Mezirow's theory and the work done by Kember.

## **KEYWORDS**

Reflection, critical reflection, transformative learning, problem-based learning, higher education, reflection questionnaire, cognitive development

## **AIM OF STUDY**

Problem-based learning has been argued to stimulate reflection (e.g., Hmelo, 2004) and critical reflection (e.g., Higgins, Flower, and Petragalla, 1991; Williams, 2001). However, as noted by Hmelo (2004), much of the research on PBL has focused more on students in

professional education rather than on students in more broad-based curricula and in bigger classes. Also, findings by Kember and his associates (2000) suggest that critical reflection “requires a major change in perspective, which is a difficult, lengthy and often painful process” (p.391). Students may not have many chances to experience this given the relatively short span of their studies. The present study aims to fill in this gap by exploring students’ reflective habits in a broad-based PBL setting.

Thus, the aim of the present study is to track the development of students’ reflective practices as they progress through their studies in a problem-based learning environment. It is hypothesized that, in a PBL environment, more senior students would exhibit higher levels of reflection compared to their juniors. The following research question was also addressed: to what extent do students develop in their levels of critical reflection as they proceed through their studies in a PBL environment?

The instrument, questionnaire on students’ reflective habits, developed by Kember and his associates (2000) directly measures students’ reflective thinking, and is based on the influential work on critical reflection and transformative learning by Jack Mezirow (1991, 2000). It was validated internally using data from a sizeable sample of nursing students (Kember et al., 2000) as well as externally with the Biggs’ Study Processes Questionnaire (Leung & Kember, 2003). It measures four levels of reflective thinking: habitual action, understanding, reflection, and critical reflection. This structure suggests a kind of hierarchy in reflective thinking, with habitual action as the lowest level of reflection (or even non-reflection), and critical reflection is the most profound.

## METHOD

The reflection questionnaire was administered to all students. Table 2 shows the response rates for each student batch. There were approximately equal numbers of students across the schools, and students’ ages ranged from 16 to 26 years.

Table 2a.  
Response rates by batch (first stage)

Batch	No. of respondents
New 1 <sup>st</sup> years	91
1 <sup>st</sup> years	90
2 <sup>nd</sup> years	99
3 <sup>rd</sup> years	111
Total	391

## RESULTS

Respondents’ scale scores were calculated by summing the 4 items in each scale (after Kember *et al.*, 2000). Table 4 below shows the four scale means. On average, students rated themselves lowest on Habitual Action, and higher on Understanding, Reflection, and Critical Reflection.

Table 4.  
Scale means by cohort

Scale	Means by cohort (SD)				Overall mean
	2003/4 [Year 3]	2004/5 [Year 2]	2005/6 [Year 1]	2006/7 [Year 0]	
Habitual Action	13.46 (3.39)	11.46 (3.16)	11.13 (3.12)	12.08 (2.51)	12.10 (3.39)
Understanding	15.45 (2.68)	15.89 (2.36)	16.19 (2.18)	15.66 (2.12)	15.82 (2.44)
Reflection	15.20 (2.74)	15.69 (2.91)	16.54 (2.14)	14.89 (2.17)	15.76 (2.68)
Critical Reflection	15.32 (2.59)	15.07 (2.88)	15.68 (2.40)	13.87 (1.98)	15.35 (2.64)

*Year differences*

An ANOVA with post-hoc Tukey tests found significant cohort differences in scores for Habitual Action ( $F=11.54$ ,  $p<0.001$ ), Reflection ( $F=7.46$ ,  $p<0.001$ ), and Critical Reflection ( $F=9.02$ ,  $p<0.001$ ). Third-year students (2003/4 cohort) rated themselves higher than all their juniors on Habitual Action. Students who had one year of exposure to the PBL environment (2005/6 cohort) rated themselves higher on Reflection compared to their third-year seniors and to the newest cohort. The newest cohort rated themselves lowest on Critical Reflection, compared with all their seniors.

*Differences in perception of reflective habits across three years*

From these findings, a possible developmental trend may be mapped out for the processes of Habitual Action, Reflection, and Critical Reflection (see Figure 1).

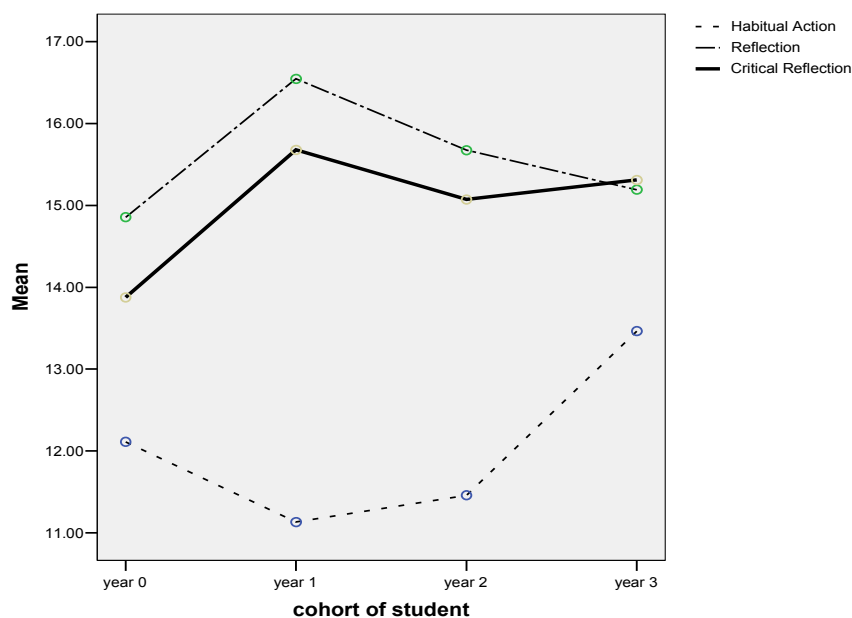
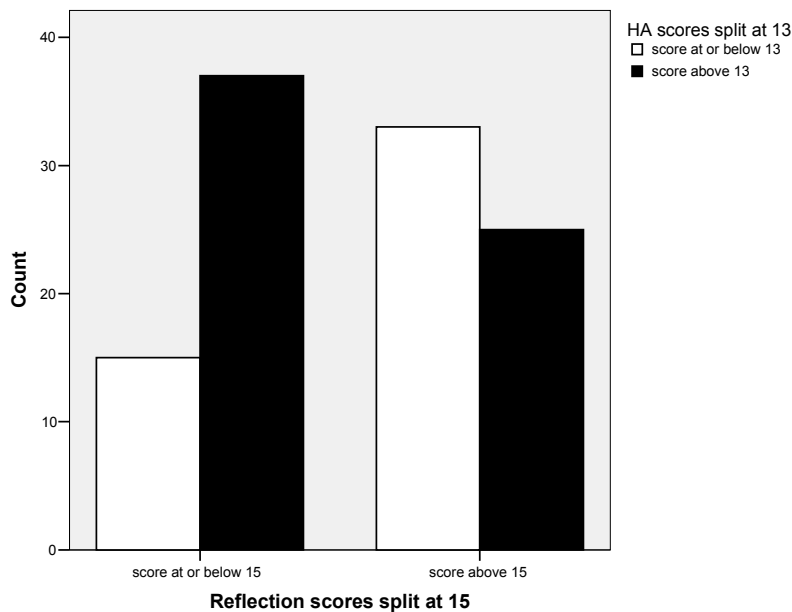


Figure 1.  
Students' perceptions of their reflective processes over three years

A split-half analysis around the mean scores for reflection and habitual action was performed for each cohort, to analyse how the two scores differed from each other as students progressed in their studies. Only the pattern for the third year students, shown in Figure 2, was significant ( $\chi^2=8.771$ ,  $p=0.004$ ). Table 5 provides a breakdown of the results.

Table 5.  
Reflection and Habitual Action scores of third-year students

Reflection scores	Habitual Action scores		Total
	At or below mean	Above mean	
At or below mean	15 (28.8%)	37 (71.2%)	52 (47.3%)



Reflection scores split at 15	Habitual Action scores		Total
	At or below mean	Above mean	
Above mean	33 (56.9%)	25 (43.1%)	58 (52.7%)
Total	48 (43.6%)	62 (56.4%)	110 (100%)

Figure 2.  
Third year students' perceptions: Reflection and Habitual Action

## DISCUSSION

The pattern revealed from the data supports our hypothesis that students increase in their levels of reflection, but this is only true insofar as first-year students are concerned.

The sharp increase in the scores for reflection and critical reflection over the first-year period suggest a kind of 'culture shock' for new students entering the PBL environment from a more didactic system to one that demands a certain level of independence. The decrease in students' perceptions of their Reflection habits after one year may have to do with the difference in the nature of modules between the first year and subsequent years. In the first year, students take more broad-based modules which focus on developing thinking and other skills; modules in subsequent years are more directly related to the students' diploma programmes. With the difference in focus, it is possible that students then spend less time on reflecting on their learning processes, than they used to do with their general first-year modules.

The dramatic increase in levels of habitual action at the end of the third year was somewhat unexpected; this is possibly due to the assessment requirements of each module, which can become habitual activities. When done daily over the course of three years, this may result in some form of routinisation. The results from the split-half analysis of the third-year students lend some support to this possibility.

To what extent have students developed in their levels of critical reflection in this environment? The present data show a general increase in critical reflection from the point of entry to the end of the first year, after which, the levels remain the same. This result supports Kember et al's (2000) own findings.

### *Conclusion*

While a cross-sectional study was helpful in shedding light on students' reflective thinking in different years, cohort effects should not be dismissed. Hence, the next step is to track students from the 2006/7 cohort over the course of their studies and also examine other sources of 'online' data, such as students' grades, and their actual reflection journals. However, at present, what this study provides are data to suggest possible trends in students' reflective developments, particularly in a broad-based problem-based learning environment.

1172 words

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