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Brief report

# Reflective thinking levels in medical interns: a cross-sectional study using the Kember questionnaire

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## Abstract

**Background & Objective:** Reflection is a key educational concept that helps students analyze their experiences and understand their own learning processes. This study assessed the level and components of reflective capacity and examined their associations with selected demographic variables among medical interns.

**Materials & Methods:** This cross-sectional study included 150 general medical students in their internship phase who had completed at least one clinical rotation. Participants were selected through simple random sampling from eligible interns during the 2023–2024 academic year. Data were collected using the Kember Reflection Questionnaire, which measures four components of reflection: habitual action, understanding, reflection, and critical reflection. Scores range from 16 to 80, with higher scores indicating greater reflective capacity. Data analysis was performed using SPSS version 25, applying non-parametric statistical tests including the Mann–Whitney U and Kruskal–Wallis tests. Sample size was determined based on feasibility and consistency with previously published studies using comparable designs and the same instrument.

**Results:** The mean total reflection score was 49.93 ± 9.02, falling within the mid-range of the possible scale. Among the reflective components, critical reflection showed the highest mean score, whereas understanding demonstrated the lowest. A statistically significant gender difference was observed only in the reflection subscale, with female students scoring higher than male students ($p = 0.049$). No statistically significant differences were observed across other reflective components or in relation to internship duration.

**Conclusion:** This study provides a descriptive profile of reflective capacity among medical interns. The findings indicate variation across reflective components and show that demographic associations were limited to specific dimensions rather than reflective capacity overall. Further longitudinal or interventional studies are needed to clarify the educational significance of these observations.

**Keywords:** reflective practice; cognition; education, medical; internship and residency; surveys and questionnaires

## Introduction

Reflection is widely recognized as a fundamental educational approach that supports active learning and cognitive development, particularly in advanced educational systems [1].

In medical education, reflection enables learners to examine their experiences, evaluate underlying assumptions, and develop a deeper understanding of clinical situations [2, 3]. Through this process, students integrate theoretical knowledge with practical experience and gain insight into their strengths and learning needs, thereby supporting their ongoing professional development [4, 5].

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Rather than representing isolated outcomes, educational constructs such as deep learning, clinical skill development, and clinical decision-making can be understood as interrelated aspects of reflective learning. Reflection provides a cognitive framework through which learners organize knowledge, interpret clinical experiences, and adapt their reasoning in practice. Previous studies have shown that reflective activities in clinical education are associated with learning engagement and clinical reasoning [6].

Educational theory describes reflection as a multidimensional construct encompassing habitual action, understanding, reflection, and critical reflection, which together represent increasing levels of cognitive engagement with experience [7]. This conceptualization highlights reflection as a process that varies in depth and quality across learners and educational contexts, rather than as a uniform skill [1, 7]. Reflective practice is closely linked to self-regulated learning, as both involve monitoring one's own understanding and adjusting learning strategies accordingly. Feedback serves as a key mechanism that supports this regulatory process, helping learners identify gaps in their knowledge and refine their clinical reasoning. Therefore, examining reflective capacity provides insight not only into how learners process experiences but also into how they may respond to educational guidance [5, 8, 9–11]. Recent evidence suggests that structured reflective practices, such as reflective diaries, are associated with higher levels of self-regulated learning by supporting self-awareness, identifying learning gaps, and facilitating instructor feedback. These findings provide a conceptual rationale for examining reflection within clinical medical education, without implying a direct causal relationship [12–15]. Despite this growing body of literature, empirical research in the Iranian context that systematically assesses reflective capacity using validated multidimensional instruments remains limited. In particular, few studies have explored the distribution of reflective components and their associations with demographic characteristics among clinical medical students. Therefore, the present study used the Kember Reflective Thinking Questionnaire due to its theoretical grounding and extensive use in similar educational settings.

## Materials & Methods

### *Design and setting(s)*

This cross-sectional analytical study was conducted at Zahedan University of Medical Sciences from September 23, 2023 to September 21, 2024 to describe the level and components of reflective capacity and to examine their associations with selected demographic variables among medical interns.

### *Participants and sampling*

The study population consisted of general medical students in the internship phase who had completed at least one clinical rotation. Eligibility criteria included enrollment at Zahedan University of Medical Sciences, completion of at least one clinical apprenticeship, and willingness to participate; visiting or transfer students were excluded. A census sampling approach was employed, and all eligible interns at the university during the 2023–2024 academic year were invited to participate. A total of 150 medical interns were ultimately included in the final analysis, a sample size comparable to those reported in previous studies using the Kember Reflection Questionnaire or similar designs in medical education research [5, 12, 16].

### *Tools/Instruments*

Reflective capacity was assessed using the Kember Reflection Questionnaire (RQ) [16], a validated 16-item instrument measuring four components: habitual action, understanding, reflection, and critical reflection. Each component includes four items rated on a five-point Likert scale, yielding subscale scores from 4 to 20 and a total score from 16 to 80.

The Kember RQ has been widely used in medical and health professions education and has shown acceptable psychometric properties in prior studies [5, 12, 16]. In this study, content validity was reviewed by experts in medical education, and a pilot study with 30 medical students demonstrated good internal consistency for the overall scale (Cronbach's $\alpha = 0.87$).

### *Data collection methods*

Data were collected in person during clinical rotations. After explaining the study and obtaining informed consent, printed questionnaires were distributed at the end of educational sessions. Participation was voluntary, and completion took approximately 15–20 minutes; questionnaires were completed anonymously to ensure confidentiality.

### *Data analysis*

Data were analyzed using SPSS for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Quantitative variables were described using mean and standard deviation, and qualitative variables were presented as

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frequencies and percentages. Normality of the total reflective capacity scores and its subscales was assessed by the Kolmogorov–Smirnov test across gender and internship duration groups; as none of the variables followed a normal distribution ($p < 0.05$), non-parametric tests were applied for further comparisons. Accordingly, the Mann–Whitney U test was used to compare reflective capacity scores between male and female interns, and the Kruskal–Wallis H test was applied to examine differences across internship duration groups. A p-value less than 0.05 (two-tailed) was considered statistically significant throughout the analysis.

## Results

A total of 150 medical interns from Zahedan University of Medical Sciences (2023–2024) participated in the study, including 85 males (56.7%) and 65 females (43.3%). Mean internship duration was 9.62 ± 4.43 months, and nearly half of the participants were in their second six-month internship period (n = 71, 47.3%).

As shown in **Table 1**, critical reflection had the highest mean score (13.36 ± 2.91), followed by reflection (12.62 ± 3.08), habitual action (12.24 ± 2.45), and understanding (11.70 ± 2.66). The mean total reflection score was 49.93 ± 9.02, indicating a moderate overall level of reflection among the participants.

Gender comparisons showed no statistically significant differences in habitual action ($p = 0.06$) or understanding ($p = 0.91$). However, female students scored significantly higher than male students in the reflection component ($p = 0.049$). No significant gender differences were observed in critical reflection ($p = 0.66$) or in the total reflection score ($p = 0.76$) (**Table 2**).

**Table 1.** Mean scores of reflective components among medical interns (n = 150)

| Reflective components | Mean ± SD |
|---|---|
| Habitual action | 12.24 ± 2.45 |
| Understanding | 11.70 ± 2.66 |
| Reflection | 12.62 ± 3.08 |
| Critical reflection | 13.36 ± 2.91 |
| **Total score** | 49.93 ± 9.02 |

**Abbreviations:** n, number of participants; SD, standard deviation.

With regard to internship duration, no statistically significant differences were found in habitual action ($p = 0.40$), understanding ($p = 0.52$), or reflection ($p = 0.54$). Although critical reflection scores increased with longer internship duration, this trend was not statistically significant ($p = 0.28$) (**Table 2**).

Overall, reflective capacity appeared to vary only modestly across demographic variables (**Figure 1**). Given the descriptive and cross-sectional design of the study, these findings should be interpreted cautiously.

**Table 2.** Comparison of reflective learning components according to gender and internship duration among medical interns

| Demographic variable | Category | Habitual action Mean ± SD (Median) | Understanding Mean ± SD (Median) | Reflection Mean ± SD (Median) | Critical reflection Mean ± SD (Median) | Total score Mean ± SD (Median) |
|---|---|---|---|---|---|---|
| **Gender** | Male | 12.52 ± 2.66 (12) | 11.76 ± 2.90 (12) | 12.18 ± 2.92 (12) | 13.40 ± 3.12 (13) | 49.88 ± 10.08 (49) |
| | Female | 11.86 ± 2.10 (12) | 11.63 ± 2.34 (12) | 13.18 ± 3.21 (13) | 13.32 ± 2.62 (13) | 50.00 ± 7.47 (51) |
| | Sig. | U = 2267.5 p = 0.057 | U = 2734.5 p = 0.915 | U = 2246.5 p = 0.490 | U = 2647.5 p = 0.661 | U = 2681.5 p = 0.758 |
| **Internship duration** | < 6 months | 11.87 ± 2.59 (12) | 11.60 ± 2.68 (12) | 12.18 ± 2.89 (12) | 12.69 ± 3.19 (13) | 48.36 ± 9.44 (48) |
| | 6–12 months | 12.43 ± 2.26 (12) | 11.98 ± 2.54 (12) | 12.56 ± 3.07 (12) | 13.56 ± 2.73 (14) | 50.54 ± 8.74 (51) |
| | > 12 months | 12.19 ± 2.63 (12) | 11.34 ± 2.83 (12) | 13.02 ± 3.24 (13) | 13.54 ± 2.96 (14) | 50.10 ± 9.19 (51) |
| | Sig. | H = 1.841 p = 0.398 | H = 1.303 p = 0.521 | H = 1.240 p = 0.538 | H = 2.670 p = 0.263 | H = 2.549 p = 0.280 |

**Note:** The Mann–Whitney U test was used to compare reflective learning scores between male and female interns. The Kruskal–Wallis H test was used to compare scores across internship duration groups.

**Abbreviations:** SD, standard deviation; Sig., statistical significance; p, probability value; U, Mann–Whitney U test statistic; H, Kruskal–Wallis H test statistic; df, degrees of freedom.

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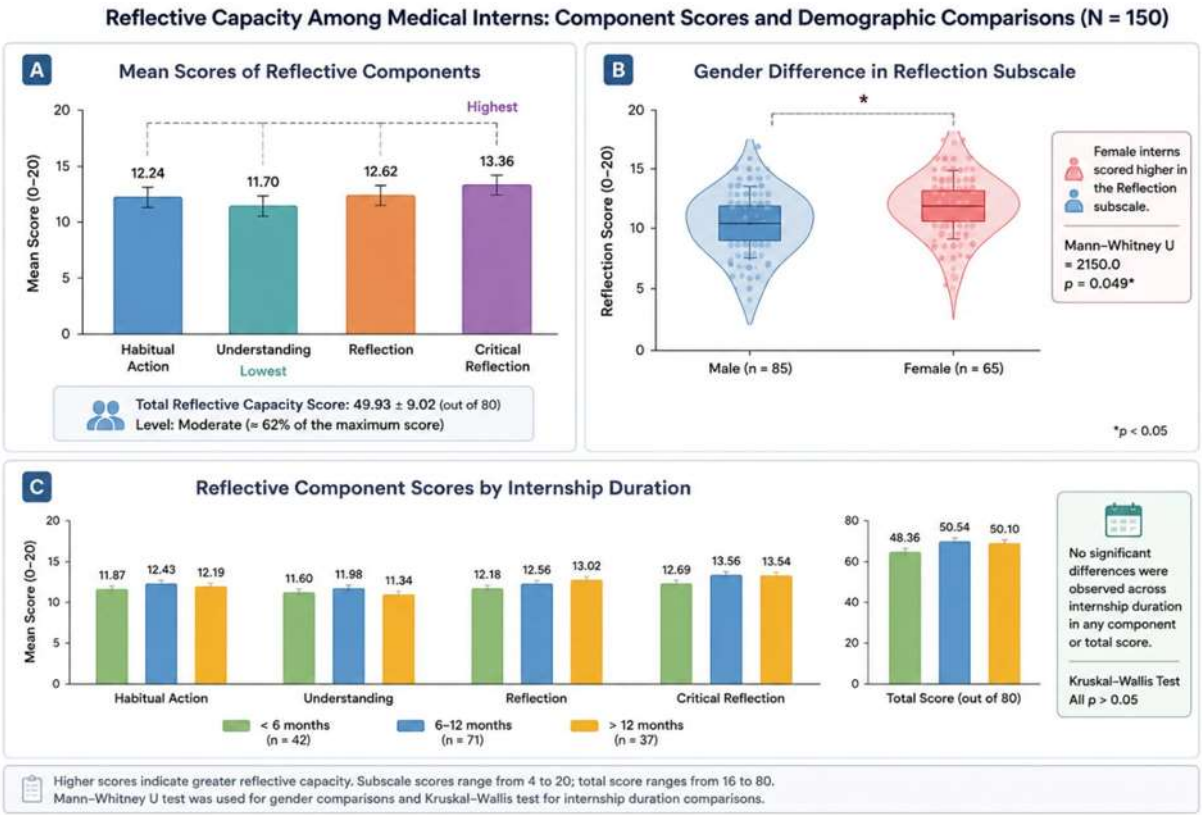


**Figure 1.** Distribution of reflective components and their associations with demographic variables among medical interns

## Discussion

The present study examined reflective capacity among medical interns and explored its association with gender and internship duration using Kember's reflective thinking framework. Overall, participants demonstrated a moderate level of reflective capacity, with noticeable variation across the four dimensions of reflective thinking. Among these dimensions, critical reflection scored highest, whereas understanding scored lowest. In addition, gender differences were limited to the reflection subscale, while no significant associations were observed between internship duration and any component of reflective capacity. Collectively, these findings suggest that reflective thinking among medical interns is multidimensional and that demographic characteristics have only limited associations with its various components. The overall level of reflective capacity observed in this study suggests that medical interns possess an established, though not fully developed, ability to engage in reflective thinking during clinical education. This observation is broadly consistent with the educational philosophy underlying competency-based medical education, which emphasizes reflective practice as an essential professional competency rather than an innate characteristic [2, 20]. Similar conclusions have been reported by Fragkos, whose umbrella review highlighted reflection as an indispensable element of healthcare education, contributing to clinical judgment, professional growth, and lifelong learning when embedded within structured educational environments [19]. Likewise, Sandars argued that reflection should be regarded as a learnable educational process requiring deliberate instructional support rather than spontaneous development through experience alone [2].

Among the four reflective dimensions, critical reflection achieved the highest score. Within Kember's framework, critical reflection represents the most advanced stage of reflective thinking and involves critically examining previously held assumptions, reconsidering existing perspectives, and reconstructing meaning based on experience [16]. The relatively higher performance in this domain may suggest that many interns had opportunities during clinical rotations to question their decisions, integrate feedback, and reconsider previous clinical assumptions. Such opportunities frequently arise during patient management, clinical discussions, bedside teaching, and multidisciplinary interactions, all of which may encourage deeper reflective engagement.

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This finding aligns with previous literature emphasizing the educational value of higher-order reflection in medical training. Aronson described critical reflection as an essential process through which learners transform clinical experiences into meaningful professional learning [4]. Similarly, Khoshgoftar and Barkhordari-Sharifabad reported that higher reflective capacity was positively associated with stronger dispositions toward critical thinking among medical students, suggesting conceptual overlap between reflective analysis and higher-order cognitive processing [12].

However, evidence across studies is not entirely consistent. Some investigations have reported only moderate or relatively low levels of higher-order reflection among health professions students, particularly in educational environments where structured opportunities for reflection are limited [5, 11, 13]. Differences between studies may reflect variations in curricula, institutional culture, educational support, learner characteristics, or the assessment instruments employed rather than true differences in reflective ability. Consequently, direct comparisons should be interpreted cautiously. In contrast, the understanding component demonstrated the lowest score among the reflective dimensions. Within Kember's model, understanding reflects meaningful comprehension of concepts without necessarily involving critical examination or transformation of existing beliefs [16]. The lower score in the understanding component may indicate variability across reflective dimensions. However, the present study was not designed to determine the underlying causes of this finding; further research is required to clarify factors associated with differences among reflective components. Therefore, interpretations regarding potential educational or cognitive explanations remain speculative and should be avoided.

The habitual action component occupied an intermediate position within the reflective profile. Habitual action refers to learning behaviors that become largely automatic through repetition and experience, requiring minimal conscious reflection [16]. From an educational perspective, some degree of habitual performance is expected during clinical training because routine procedural skills and standardized clinical tasks frequently become automated with repeated practice. Nevertheless, excessive reliance on habitual action without reflective evaluation has been viewed as less desirable because it may reduce opportunities for adaptive learning and critical appraisal of clinical decisions [2, 19]. The findings of this study suggest that interns did not rely exclusively on habitual processing, which may indicate a reasonable balance between routine clinical performance and reflective engagement.

The present study identified a statistically significant gender difference only in the reflection subscale, with female interns reporting higher reflective scores than their male counterparts.

Within Kember's framework, reflection represents the deliberate reconsideration of experiences, evaluation of one's own actions, and exploration of alternative approaches to future practice rather than automatic or routine responses [16]. This finding may suggest that female students engaged somewhat more frequently in conscious reflective processes during clinical learning. Similar observations have been reported by Khadija et al., who found gender-related differences in reflective practices among medical students studying anatomy [21]. Likewise, Crump et al. suggested that aspects of professional identity formation and reflective engagement may differ between male and female medical students throughout training [17].

No statistically significant differences were observed across internship duration for any reflective component or for the total reflective capacity score. Although reflection and critical reflection appeared numerically higher among students with longer internship experience, these differences did not reach statistical significance. Given the cross-sectional nature of the study, these observations should not be interpreted as developmental trends; instead, they may simply reflect normal variation within the study population.

The absence of a significant association between internship duration and reflective capacity is noteworthy because clinical exposure is often assumed to enhance reflective thinking through increasing patient encounters and professional responsibilities. However, educational theory suggests that reflection is unlikely to develop solely through accumulated experience. Rather, reflective capacity appears to require structured educational opportunities, guided facilitation, meaningful feedback, and intentional engagement with clinical experiences [2,4,7,11].

Similar arguments have been advanced by Keshmiri et al., who described opportunities for reflection as a "missing link" within clinical education, emphasizing that reflection should be deliberately incorporated into learning environments rather than expected to emerge automatically [11]. Likewise, Aronson highlighted the importance of structured educational strategies for

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cultivating reflective thinking throughout medical training [4].

From an educational perspective, the variability observed across reflective dimensions reinforces the view that reflective capacity is not a single homogeneous construct. Educational interventions may therefore benefit from targeting specific dimensions of reflection rather than focusing exclusively on overall reflective scores. The literature supports several evidence-based approaches for strengthening reflective practice, including structured reflective writing, guided feedback, facilitated debriefing following clinical encounters, reflective portfolios, mentoring relationships, and group reflection sessions [1,2,4,9,14]. These educational strategies provide learners with opportunities to critically examine their experiences, integrate feedback, and progressively develop higher levels of reflective thinking.

The present study has several strengths. It employed the well-established Kember Reflection Questionnaire, allowing reflective thinking to be examined across multiple theoretically grounded dimensions rather than as a single overall construct [16]. Furthermore, the study evaluated reflective capacity among medical interns who routinely encounter authentic clinical experiences, thereby providing insight into reflection within the context of workplace-based learning.

Several limitations should also be acknowledged. First, the cross-sectional design precludes causal inference and does not permit evaluation of changes in reflective capacity over time. Second, participants were recruited from a single medical school, which may limit the generalizability of the findings to other educational settings. Third, reflective capacity was assessed using a self-report questionnaire, making the results susceptible to social desirability and response biases. These limitations should be considered when interpreting the findings but do not diminish the value of the study as an initial description of reflective capacity among clinical medical students.

## Conclusion

Overall, reflective capacity among medical interns appears to be multidimensional, showing only limited associations with demographic characteristics. The significant gender difference in the reflection subscale warrants further investigation, while the lack of association with internship duration supports the view that reflective development may depend more on the quality of educational experiences than on clinical exposure alone. Together, these findings underscore the importance of deliberately integrating structured reflective opportunities into undergraduate medical education to foster reflective practitioners and lifelong learners.

## Ethical considerations

This study was approved by the Ethics Committee of Zahedan University of Medical Sciences (ethical approval code: IR.ZAUMS.REC.1402.065). Written or oral informed consent was obtained from all participants before data collection. Participation was entirely voluntary, and students were assured that withdrawal at any point would carry no academic consequences. All data were collected anonymously, and confidentiality was maintained throughout the study.

## Artificial intelligence utilization for article writing

ChatGPT version 4.5 was used in the preparation of Figure 1 and for Persian-to-English translation.

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## Conflict of interest statement

The authors declare no conflict of interest.

## Author contributions

LS, FS, and AK were involved in all aspects of the study, including conceptualization, data collection, analysis, interpretation of results, and manuscript writing. JDH served as the statistical consultant and provided critical guidance on methodology, data analysis, and interpretation of findings. All authors reviewed and approved the final version of the manuscript prior to submission.

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## Data availability statement

The data are available upon reasonable request from the corresponding author.

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