World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Knowledge, Attitudes, and Training Needs of Veterinary Technical Officers in Small Animal Clinical Management: A Cross-Sectional Study in Bojonegoro, Indonesia

Nanik Hidayatik [1,*], Nusdianto Triakoso [2], Epy Muhammad Luqman [3], Wiwik Misaco [2], Mirza Atikah Madarina Hisyam [2] and Ira Sari Yudaniayanti [2]

[1] *Division of Basic Veterinary Medicine, Department of Veterinary Science, Faculty of Veterinary Medicine, Universitas Airlangga, Indonesia.*
[2] *Division of Veterinary Clinic, Department of Veterinary Science, Faculty of Veterinary Medicine, Universitas Airlangga, Indonesia.*
[3] *Division of Veterinary Anatomy, Department of Veterinary Science, Faculty of Veterinary Medicine, Universitas Airlangga, Indonesia.*

World Journal of Advanced Research and Reviews, 2026, 30(02), 2724-2731

Publication history: Received on 22 April 2026; revised on 27 May 2026; accepted on 30 May 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.30.2.1560

Abstract

Background: Veterinary Technical Officers (VTOs) serve as frontline personnel in small animal health management at the district level. However, evidence-based evaluations of their knowledge, attitudes, and training needs in small animal clinical management remain limited in Indonesia.

Objective: This study aimed to evaluate the baseline knowledge, attitudes, training satisfaction, and training needs of VTOs regarding small animal case handling and treatment in Bojonegoro Regency, East Java, Indonesia.

Methods: A cross-sectional study was conducted involving 27 VTOs from Disnakkan Bojonegoro who participated in a Technical Guidance (Bimbingan Teknis) program. A validated structured questionnaire assessed knowledge and attitudes (Likert scale, items P9–P18), training needs and expectations (items P19–P23), and competency using a 15-item pre-test and post-test. Internal consistency was assessed using Cronbach's alpha. The Wilcoxon Signed-Rank Test was applied for pre-post comparison. A Satisfaction Index (SI) was computed as (mean/5) × 100%.

Results: The mean knowledge and attitude score was 4.34/5 (SI = 86.8%), while the mean training needs score was 4.41/5 (SI = 88.1%). The highest training need was identified for practical medication training (P20, P21; SI = 91.9% each). The pre-test mean was 14.96/15, with all 27 participants achieving a perfect post-test score (15/15). The Wilcoxon test showed no statistically significant difference ($W = 0$, $p = 0.317$), attributed to a ceiling effect. Instrument reliability was excellent (Cronbach's $\alpha = 0.947$). Training satisfaction was high (92.6% of participants rated score ≥4), with a strong positive correlation between competency and satisfaction ($\rho = 0.816$, $p < 0.001$).

Conclusion: VTOs in Bojonegoro demonstrated high baseline competency and strong satisfaction with the technical guidance program. Priority training needs include practical pharmacology, clinical diagnostic skills, and owner communication. A ceiling effect limited pre-posttest sensitivity, suggesting future programs should incorporate advanced competency assessments. Regular follow-up mentoring and provision of diagnostic tools are recommended.

Keywords: Veterinary Technical Officers; Small Animal; Knowledge, Attitudes, And Practices; Training Needs Assessment; Satisfaction Index; Bojonegoro

* Corresponding author: Nanik Hidayatik

1. Introduction

Small animal clinical management has become an increasingly critical area of veterinary public health in Indonesia, driven by rising rates of pet ownership and growing demand for animal health services at the community level [1]. Cats, dogs, and other companion animals are now commonly found in both urban and rural households, yet access to qualified veterinary care remains uneven across regions [2]. In district-level settings such as Bojonegoro Regency, East Java, veterinary technical officers (VTOs) locally known as Petugas Medik Veteriner (PMV) function as the primary frontline providers of animal health services, operating under the supervision of the local livestock authority (Dinas Peternakan dan Perikanan/Disnakkan) [3].

Despite their central role, VTOs often face challenges including limited diagnostic equipment, insufficient pharmacological knowledge, and difficulties in communicating with animal owners [4]. These gaps are particularly significant in the management of small animal cases such as dermatological conditions (including scabies), gastrointestinal disorders, viral infections, and traumatic injuries conditions that represent the most frequently encountered presentations in the field [5]. Without adequate training and ongoing capacity development, VTOs may be unable to provide timely and appropriate clinical interventions, leading to preventable morbidity and unnecessary referrals.

Training needs assessment (TNA) is a structured approach used to identify gaps between current and desired performance levels, enabling the design of targeted and effective training programs [6]. In the context of veterinary workforce development, TNA frameworks drawing from the knowledge, attitudes, and practices (KAP) model have been widely applied to evaluate training relevance and participant satisfaction across diverse health professions [7,8]. However, evidence-based TNA studies specific to VTOs managing small animals in Indonesian district settings remain scarce.

This study was conducted in the context of a community service program (Pengabdian kepada Masyarakat) which organized a Technical Guidance (Bimbingan Teknis) session on effective strategies for small animal case handling and treatment. The program targeted VTOs employed by Disnakkan Bojonegoro and was designed to strengthen frontline competencies in small animal clinical management.

The primary objectives of this study were to: (1) evaluate the baseline knowledge and attitudes of VTOs regarding small animal clinical management; (2) assess the relevance and satisfaction of the training program using a validated Likert-based instrument; (3) identify priority training needs for future program development; and (4) examine the relationship between baseline competency and training satisfaction.

2. Materials and Methods

2.1. Study Design and Setting

A cross-sectional descriptive study was conducted during a Bimbingan Teknis (Technical Guidance) program organized by Disnakkan Kabupaten Bojonegoro, East Java, Indonesia. The study followed an evaluative research design, incorporating both pre-post competency assessment and Likert-based attitude and needs evaluation.

2.2. Participants

A total of 27 VTOs participated in the study. Eligibility criteria included: (1) active employment at Disnakkan Bojonegoro or affiliated institutions; (2) participation in the Technical Guidance program; and (3) provision of written consent. The sample comprised predominantly male participants (74.1%), with the majority holding a Bachelor's degree or Veterinary Professional Education Study Program (59.3%). Most participants had extensive field experience exceeding 10 years (59.3%), and the primary role was that of Petugas Medik Veteriner (85.2%).

2.3. Instrument

A structured questionnaire was developed and comprised four sections: (I) Respondent demographics; (II) Knowledge and attitudes 10 items (P9–P18) on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree); (III) Training needs and expectations 5 items (P19–P23) on the same scale; and (IV) Open-ended questions on field cases, challenges, and desired training materials.

Competency was assessed using a 15-item multiple-choice pre-test and an identical post-test covering domains including: definition of small animals, clinical signs of illness, initial case management steps, hygiene and disease prevention, pharmacological principles, antibiotic resistance, wound care, referral indications, and inter-agency collaboration.

Instrument reliability was assessed using Cronbach's alpha coefficient. The knowledge and attitude subscale (P9–P18) achieved $\alpha = 0.958$, the training needs subscale (P19–P23) achieved $\alpha = 0.883$, and the full Likert instrument (P9–P23) achieved $\alpha = 0.947$, indicating excellent internal consistency [9].

2.4. Statistical Analysis

Descriptive statistics (mean, standard deviation, frequency, percentage) were computed for all variables. The Satisfaction Index (SI) was calculated as SI (%) = (mean score / 5) × 100 and interpreted as: SI ≥ 90% = Very Good; 70–89% = Good; 50–69% = Sufficient; <50% = Poor [10]. Likert mean scores were categorized as: ≥4.50 = Very Good; 3.50–4.49 = Good; 2.50–3.49 = Fair; <2.50 = Poor.

The Shapiro-Wilk test was used to assess normality of pre-test scores. Due to significant departure from normality ($W = 0.193$, $p < 0.001$), the Wilcoxon Signed-Rank Test was applied for pre-post comparison. The N-Gain Score was computed using the formula: N-Gain (%) = [(post-test − pre-test) / (maximum − pre-test)] × 100, with categories: >70% = High; 30–70% = Moderate; <30% = Low [11]. Spearman's rank correlation was used to examine the relationship between training satisfaction (P18) and total knowledge scores. All analyses were performed using Python (scipy.stats library). Statistical significance was set at $p < 0.05$.

2.5. Ethical Considerations

All participants provided informed consent prior to data collection. Respondent anonymity was maintained with coded identifiers (Res_01–Res_27). Data were used exclusively for academic and publication purposes in accordance with the Declaration of Helsinki principles.

3. Results

3.1. Demographic Characteristics

Table 1 presents the demographic profile of the 27 participants. The majority were male (74.1%) and held a Bachelor's degree or Veterinary Professional Education Study Program (59.3%). Most had more than 10 years of field experience (59.3%), and the dominant role was that of Petugas Medik Veteriner (PMV) (85.2%). Participant ages ranged from 32 to 58 years, with a mean of 45.4 ± 7.6 years.

Table 1 Demographic characteristic of participants (n = 27)

Characteristic	Category	Frequency (n)	Percentage (%)
Sex	Male	20	74.07
	Female	7	25.93
Education Background	Senior High School	7	25.93
	Diploma	3	11.11
	Bachelor/Veterinary Professional Education	16	59.26
	Master/Doctoral	1	3.70
Experience	< 1 year	1	3.70
	1 – 5 years	3	11.11
	6 – 10 years	7	25.93
	> 10 years	16	59.26
Role/Position	PMV	23	85.19

	Disnakkan Bojonegoro employee	1	3.70
	Veterinary Paramedic	2	7.41
	Other	1	3.70

3.2. Knowledge, Attitudes, and Likert-Scale Analysis

Table 2 presents the descriptive statistics for all Likert-scale items. The overall mean for the knowledge and attitude subscale (P9–P18) was 4.34 ± 0.76 (SI = 86.8%), categorized as Good. The highest scoring items were P13 (medication appropriateness: mean = 4.48, SI = 89.6%) and P16 (referral importance: mean = 4.48, SI = 89.6%). The lowest scoring item was P10 (differentiating severity levels: mean = 4.11, SI = 82.2%).

The training needs subscale (P19–P23) yielded a mean of 4.41 ± 1.04 (SI = 88.1%). The highest needs were identified for practical medication training (P20: mean = 4.59, SI = 91.9%; P21: mean = 4.59, SI = 91.9%, both categorized as Very Good). The item with the greatest variability was P23 (continued mentoring: mean = 4.11, SD = 1.42), reflecting divergent participant preferences.

Table 2 Descriptive Statistics of Likert-Scale Items (n = 27)

Code	Statement	Mean	SD	Min	Max
Section II: Knowledge and Attitudes					
P9	Understand the common signs of illness in small animals	4.19	0.68	3	5
P10	Be able to differentiate between mild, moderate, and emergency conditions	4.11	0.8	3	5
P11	Know the appropriate initial steps when encountering a case	4.3	0.67	3	5
P12	Understand the importance of cage/environmental hygiene	4.33	0.88	1	5
P13	Know how to use medication according to indications and dosage	4.48	0.89	1	5
P14	Understand the risk of antibiotic resistance due to improper use	4.37	0.63	3	5
P15	Have encountered cases of diarrhea, wounds, infections, worms, or respiratory problems	4.37	0.56	3	5
P16	Know the importance of referring certain cases to a veterinarian	4.48	0.58	3	5
P17	Understand the importance of observing clinical signs before treatment	4.44	0.58	3	5
P18	Feel the technical training is very helpful in decision-making	4.33	0.88	1	5
Section III: Training Needs and Expectations					
P19	Require practical guidelines for the initial management of small animal cases	4.41	0.89	1	5
P20	Require training on the safe and effective administration of medications	4.59	0.84	1	5
P21	Require educational materials regarding warning signs and conditions that require referral	4.59	0.89	1	5
P22	Require simple educational media, such as leaflets, posters, and pocket handbooks	4.37	0.88	1	5
P23	Expect continued assistance and follow-up support after the program	4.11	1.42	0	5

3.3. Pre-Test, Post-Test, and N-Gain Score

Table 3 summarizes the competency assessment results. The mean pre-test score was 14.96 ± 0.19 out of 15, with all 27 participants achieving a perfect post-test score (15/15). The Shapiro-Wilk test confirmed non-normal distribution of pre-test scores ($W = 0.193$, $p < 0.001$). The Wilcoxon Signed-Rank Test yielded $W = 0$, $p = 0.317$, indicating no statistically significant difference between pre-test and post-test scores.

The mean N-Gain Score was 0.23% (range: 0–6.25%), with all participants classified in the Low category (<30%). This result reflects a ceiling effect, as baseline competency was already near maximum before the intervention.

Table 3 Pre-Test, Post-Test Results and N-Gain Score (n = 27)

A. Descriptive statistic of Pre- and Post-test			
Statistics	**Pre-Test**	**Post-Test**	**Difference (Post–Pre)**
Number of Respondents	27	27	
Minimum Score	14	15	1
Maximum Score	15	15	0
Mean Score	14.963	15	0.037
Standard Deviation	0.189	0	
Median Score	15	15	
B. Hipothesis test: Differentiation of Pre- and Post-test			
Statistic test	**Statistic value**	**p-value**	**Conclusion**
Shapiro-Wilk (Pre-Test normality)	W = 0.1930	p = 0.0000	Not Normal (p < 0.05)
Wilcoxon Signed-Rank Test	W = 0.0000	p = 0.3173	Not Significant (p > 0.05)
C. Category distribution of N-Gain Score			
Category	**N-Gain Criteria**	**Total (n)**	**Percentage (%)**
High	N-Gain > 70%	0	0
Medium	30% ≤ N-Gain ≤ 70%	0	0
Low	N-Gain < 30%	27	100

3.4. Training Satisfaction and Correlation Analysis

Item P18, serving as a proxy for training satisfaction, yielded a mean of 4.33/5 (SI = 86.7%). A total of 92.6% of participants (n = 25) rated the training as helpful or very helpful (score ≥ 4). Only one respondent rated it as unhelpful (score = 1), and one expressed ambivalence (score = 3).

Spearman's rank correlation analysis revealed a strong and statistically significant positive relationship between total knowledge scores (P9–P18) and training satisfaction (P18): $\rho = 0.816$, $p < 0.001$. This indicates that participants with higher baseline competency reported greater satisfaction with the training content — suggesting that the program content was well-aligned with participants' existing knowledge frameworks.

A moderate significant positive correlation was also found between knowledge scores and training needs scores ($\rho = 0.422$, $p = 0.028$), indicating that participants with higher competency also demonstrated a more acute awareness of further training needs.

3.5. Qualitative Findings (Open-Ended Responses)

Thematic analysis of open-ended responses identified three major categories: (1) most frequently encountered cases, (2) primary field challenges, and (3) priority training materials needed. The most common small animal cases encountered in the field were dermatological conditions, predominantly scabies (mentioned by 8 respondents), followed by gastrointestinal disorders including diarrhea and enteritis (n = 5), viral and bacterial infections (n = 4), traumatic wounds and fractures (n = 3), and poisoning (n = 2). Three respondents reported rarely encountering small animal cases.

Key challenges identified included: (1) limited diagnostic equipment and laboratory support (most frequently cited); (2) restricted availability and knowledge of appropriate medications; (3) difficulties in communicating with and

educating animal owners; (4) infrequent exposure to small animal cases; and (5) limited species-specific technical knowledge.

Priority training materials requested by participants included: practical pharmacology and medication administration for small animals (most frequently requested), field diagnostic techniques and clinical sign recognition, periodic refresher training and practical simulation, communication and client education strategies, and disease prevention and control protocols.

4. Discussion

This study provides a comprehensive KAP-based evaluation of VTOs in Bojonegoro Regency, representing one of the first evidence-based TNA assessments for this occupational group in an Indonesian district veterinary context. The findings reveal a workforce characterized by high baseline competency and strong training satisfaction, yet facing significant practical gaps in diagnostic infrastructure, pharmacological knowledge, and owner communication skills.

The very high pre-test means (14.96/15) and perfect post-test scores across all participants indicate that the VTO cohort entered the training program with near-maximal theoretical knowledge. This finding is consistent with the predominantly experienced, tertiary-educated profile of participants, 85.2% of whom held Bachelor's degree or Veterinary Professional Education Study Program qualifications and 59.3% had more than a decade of field experience. Similar ceiling effects have been documented in training evaluation studies targeting experienced health professionals, where validated instruments with fixed maximum scores may fail to capture more subtle competency increments [12,13]. Future evaluation designs should consider the incorporation of case-based vignettes, observed structured clinical examinations (OSCEs), or advanced-level competency frameworks to provide greater differentiation among high-performing participants [14].

The Likert-scale analysis demonstrated uniformly Good ratings across all knowledge and attitude items (mean range: 4.11–4.48), reinforcing the interpretation of high baseline competency. The slightly lower score for P10 (differentiating case severity: mean = 4.11) may reflect a specific gap in clinical triage skills a finding of practical significance, as misclassification of severity can delay appropriate care or result in unnecessary referrals [15]. This item should be prioritized in future training curricula.

The training needs subscale revealed the highest scores for items P20 and P21 (both SI = 91.9%, Very Good category), corresponding to practical medication training and knowledge of referral-indicating danger signs. These findings align with qualitative responses identifying medication knowledge and diagnostic limitations as the primary field challenges. The strong demand for pharmacological training is particularly relevant in the context of antimicrobial stewardship a priority recognized globally given that item P14 (antibiotic resistance awareness) scored Good (SI = 87.4%) but remains below the Very Good threshold [16,17].

The high training satisfaction rate (92.6%) and the strong correlation between competency and satisfaction ($\rho = 0.816$, $p < 0.001$) suggest that the Bimbingan Teknis program successfully engaged participants at an appropriate knowledge level and was perceived as directly relevant to their professional needs. This pattern in which prior competency predicts satisfaction has been observed in adult learning theory frameworks, particularly Knowles' andragogy model, which emphasizes the importance of aligning training content with learners' prior experience and self-directed learning needs [18].

The notable standard deviation for item P23 (continued mentoring: SD = 1.42) highlights a divergence in participant preferences regarding post-program follow-up. While 55.6% strongly desired continued mentoring, 14.8% expressed low interest. This heterogeneity suggests that a one-size-fits-all mentoring approach may be suboptimal; instead, differentiated follow-up strategies such as group-based mentoring, teleconsultation platforms, or self-directed continuing education modules may better accommodate the diverse needs of this participant cohort [19].

The qualitative findings provide actionable intelligence for program improvement. The dominance of dermatological cases (particularly scabies) and gastrointestinal disorders infield practice suggests that future Bimbingan Teknis programs should dedicate substantial content to these specific clinical areas. The recurrent identification of limited diagnostic equipment as a primary obstacle underscores the need for systemic investment by Disnakkan Bojonegoro in point-of-care diagnostic tools and, where feasible, mobile laboratory support.

A key limitation of this study is the use of P18 as a single-item proxy for training satisfaction, which may not fully capture multidimensional aspects of satisfaction such as training logistics, facilitator quality, and organizational support. Future

studies should employ validated multi-item satisfaction instruments, such as adapted versions of the Kirkpatrick Model Level 1 evaluation tools [20]. Additionally, the cross-sectional design precludes causal inference, and the absence of a control group limits conclusions about program efficacy.

5. Conclusion

Veterinary technical officers in Bojonegoro Regency demonstrated high baseline knowledge and positive attitudes toward small animal clinical management, with a strong ceiling effect limiting pre-posttest sensitivity. Training satisfaction was uniformly high, and a strong positive correlation between competency and satisfaction confirms the relevance and appropriateness of the Bimbingan Teknis program content.

Priority areas for future training investment include practical pharmacology and safe medication use, clinical diagnostic skill development, case-specific protocols for dermatological and gastrointestinal conditions, and communication strategies for animal owner education. Systemic improvements including provision of diagnostic equipment and institutionalization of regular refresher training are essential to sustain and build upon the competency gains of this program.

These findings contribute to the limited evidence base on VTO workforce development in Indonesia and provide a replicable evaluation framework applicable to similar community veterinary service programs across the country.

Compliance with ethical standards

Acknowledgments

The authors express sincere gratitude to all participants from Dinas Peternakan dan Perikanan Kabupaten Bojonegoro for their willingness to participate in this study. We also acknowledge the support of the organizing committee of the Bimbingan Teknis program. This study received no external funding.

Disclosure of conflict of interest

The authors declare no financial or non-financial conflicts of interest related to this work.

Statement of ethical approval

This study was conducted in accordance with the Declaration of Helsinki. All participants provided informed verbal and written consent prior to data collection. Participant identities were anonymized using coded identifiers. As this was a program evaluation study with no clinical intervention, formal ethics committee review was not required under applicable national guidelines; however, standard data confidentiality and participant protection protocols were observed throughout.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study."

References

[1] Sudarwanto MB, Lukman DW, Purnawarman T, Latif H, Pisestyani H, Sukmawinata E. Multidrug resistance extended spectrum β-lactamase and AmpC producing *Eschericia coli* isolated from the environment of Bogor Salughterhouse, Indonesia . Asian Pac J Trop Biomed. 2017;7(8):708-711.

[2] Setiawan EAN, Nugroho AD. Strategi manajemen praktik dokter hewan mandiri dalam melayani pasien hewan besar dan hewan kesayangan: studi praktek drh. lailatus sa'diyah. J Pub Sis Inform Manaj Bis. 2025;4(1):79-90.

[3] Bupati Bojonegoro Provinsi Jawa Timur. Kedudukan, susunan organisasi, uraian tugas dan fungsi serta tata kerja Dinas Peternakan dan perikanan Kabupaten Bojonegoro. Bojonegoro: Kabupaten Bojonegoro; 2021.

[4] Widayati Y, Indrawan RD, Syafitri UD. Service quality analysisi of animal health centers in west java province with the SERVQUAL method. Int J Res Rev. 2023;10(14):409-418.

[5] Handoko J, Paryuni AD, Pratam HB, Sari SRPW. A Systematic Review on Feline Internal Medicine Articles of Indonesian Veterinary Journals. Med Ked Hew. 2025;36(1):220-233.

[6] Altschuld JW, Witkin BR. From Needs Assessment to Action: Transforming Needs into Solution Strategies. Thousand Oaks, CA: Sage Publications; 2000.

[7] Mekonen AW, Mekasha YT, Feleke MG, Getaneh A, Dereje M, Bafe M, Nigussie S, Beyene AM. Evaluation of the Knowledge, Attitudes and Practice of Veterinary Professionals and Senior Animal Health Students in Central Gondar Zone, Gondar, Ethiopia: Antimicrobial Use and Resistance Perspectives. Vet Med Sci. 2024;10(6):1-10.

[8] Ting S, Pereira A, Alves A, da Silva PGV, Santos CD, Davis S, Sidjabat HE, Yan J, Francis JR, Jong JBC, Barnes TS. Knowledge, attitudes and practices of government animal health workers on antibiotic use and antibiotic resistance in Timor-Leste. Front Vet Sci. 2022;9:1-19.

[9] George D, Mallery P. IBM SPSS Statistics 26 Step by Step: A Simple Guide and Reference. 16th ed. New York: Routledge; 2019.

[10] Sudjana N. Penilaian Hasil Proses Belajar Mengajar. Bandung: PT Remaja Rosdakarya; 2009.

[11] Hake RR. Interactive-engagement versus traditional methods: a six-thousand-student survey of mechanics test data for introductory physics courses. Am J Phys. 1998;66(1):64-74.

[12] Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best practices for developing and validating scales for health, social, and behavioral research: a primer. Front Public Health. 2018;6:149.

[13] Bujang MA, Omar ED, Baharum NA. A review on sample size determination for Cronbach's alpha test. Iran J Public Health. 2018;47(4):542-553.

[14] Davis MH, Ponnamperuma GG, McAleer, Dale VHM. The objective structured clinical examination(osce) as a determinant of veterinary clinical skills. J Vet Med Educ. 2006;33(4):578-587.

[15] Westfall JM, Mold J, Fagnan L. Practice-based research — "Blue Highways" on the NIH roadmap. JAMA. 2007;297(4):403-406.

[16] World Health Organization. Global Action Plan on Antimicrobial Resistance. Geneva: WHO; 2015.

[17] Univeristy of Minnesota. Handbook of Antimicrobial Stewardship in Companion Animal Veterinary Settings, 1st ed. Saint Paul, MN: UMN; 2020.

[18] Knowles MS, Holton EF, Swanson RA. The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development. 8th ed. London: Routledge; 2015.

[19] Sargeant J, Armson H, Chesluk B, Dornan T, Eva K, Holmboe E, et al. The processes and dimensions of informed self-assessment: a conceptual model. Acad Med. 2010;85(7):1212-1220.

[20] Kirkpatrick DL, Kirkpatrick JD. Implementing the Four Levels: A Practical Guide for Effective Evaluation of Training Programs. San Francisco: Berrett-Koehler; 2007.