ORIGINAL ARTICLE

Volume 18 No. 3 2026

DOI: 10.21315/eimj2026.18.3.5

ARTICLE INFO

Submitted: 08-02-2025
Accepted: 20-05-2026
Online: 30-09-2026

Exploring The Catalysts, Barriers and Reasons in Learning Transfer of Teaching Skills from Workshop to Workplace in Faculty Development: A Mixed-Methods Study

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To cite this article: Yasmeen R, Yusoff MSB. Exploring the catalysts, barriers and reasons in learning transfer of teaching skill from workshop to workplace in faculty development: a mixed-methods study. Education in Medicine Journal. 2026;18(3):71–89. https://doi.org/10.21315/eimj2026.18.3.5

To link to this article: https://doi.org/10.21315/eimj2026.18.3.5

ABSTRACT

Faculty development has increasingly become a vital component of 21st-century medical education and plays a critical role in promoting academic excellence. The challenge is to deepen faculty knowledge and skills through an effective faculty development approach that leads to the transfer of these skills to the workplace. The aim of this study was to identify the catalysts and barriers to the transfer of teaching skills from a formal faculty development workshop to the workplace, and to conduct a detailed investigation among medical faculty to explore the reasons for their perceptions of these catalysts and barriers. This study employed an explanatory sequential mixed-methods approach; in the quantitative phase, an initial survey was conducted with the medical faculty (n = 107) using the 48-item Learning Transfer System Inventory (LTSI), categorised into 16 factors representing the catalysts and barriers in learning transfer, using census sampling at a medical institute. The qualitative phase used a focus group discussion (FGD) with medical faculty (n = 9) through purposive sampling to explore in depth the reasons for their perceptions of catalysts and barriers. The results of the survey using LTSI showed that catalysts for learning transfer with higher mean scores were motivation to transfer, performance expectation, learner readiness, self-efficacy, opportunity to use, peer support, and transfer design, and supervisor support, while barriers with lower mean scores were personal outcomes and performance coaching, following the descriptive analysis. The overall reliability of LTSI was α = 0.8. The qualitative inquiry was set into four themes using thematic analysis: personal traits, training, supervisor's role, and self-assessment. The study results highlight the complexity of skill transfer in staff development and the need for a systematic approach to elucidate the roles and impacts of various influencing catalysts and barriers.

Keywords: *Faculty development, Learning transfer, Catalysts, Barriers, Workplace*

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INTRODUCTION

Faculty development has emerged as a cornerstone of modern medical education, designed to enhance teaching competencies and foster academic excellence. It equips educators with the skills needed to adapt to innovative pedagogical methodologies, predominantly in the era of globalisation and technological advancements in medical education (1). The shift from traditional lecture-based teaching roles to dynamic, student-centred facilitation necessitates structured, evidence-based faculty development initiatives with assessment of their effectiveness. These myriad approaches to faculty development, conducted away from the medical teacher's workplace, and the most widely used formal traditional strategy are 'workshops' (2). Workshops enable educators to acquire new skills; for example, approaches to teaching (2). However, the effective transfer of these teaching skills (e.g., lecturing skills, case-based learning facilitation skills) from workshops to the workplace setting remains a significant challenge, as highlighted in the literature (3). To assess its effectiveness, the catalysts and barriers to the transfer of learned teaching skills remained unexplored.

Learning transfer is defined as the application and sustained use of knowledge and skills acquired during training. It is vital to ensure that faculty development programmes achieve their envisioned outcomes (4). The Learning Transfer System Inventory (LTSI) was chosen because it is a well-validated, self-reported instrument that has been widely adopted as a conceptual framework measuring the key constructs influencing the transfer, though other frameworks and measures also exist (5–7). The framework developed by them is foundational in shifting the focus from only training experience to behavioural change. But LTSI was chosen as it is grounded in Holton's Transfer System Model (8). The system identifies the catalysts and barriers influencing learning transfer, including individual characteristics, training design, and workplace climate (8–10). It provides a structured method for assessing and addressing the catalysts and barriers to skill transfer, making it particularly relevant in medical education, where diverse contextual challenges abound. Individual catalysts and barriers, such as motivation, cognitive ability, and the perceived relevance of training, significantly influence learning transfer. Educators who are highly motivated and view the training as aligned with their professional goals are more likely to implement new skills effectively (8, 11). Training design also plays a pivotal role in this process. Programmes incorporating active learning techniques, behavioural modelling, and problem-solving activities tailored to real-world contexts have demonstrated better outcomes in terms of skill applicability (12).

The workplace environment, as highlighted by the LTSI, profoundly influences the success of learning transfer (13). A supportive work environment, characterised by positive transfer climates, access to resources, and opportunities for skill application, enhances the likelihood of successful implementation. Peer support, supervisory encouragement, and an organisational culture valuing continuous learning further facilitate this process (14). Conversely, a lack of alignment between workplace demands and training content can create significant barriers, limiting the implementation of newly acquired competencies.

Traditional faculty development programmes often fail to bridge the gap between training and practice, particularly when conducted outside participants' work environments. Workshops isolated from real-world challenges tend to create a disconnect, reducing their long-term effectiveness(1,15). The LTSI framework emphasises embedding training within the workplace, allowing immediate application of skills and fostering reflective learning through collaboration with peers and students. This approach transforms everyday experiences into valuable learning opportunities and enhances the integration of the faculty development programme's outcomes across different domaininto practice, as reinforced by Aithal and Mishra (16).

In the context of medical education, the global shift towards innovative pedagogical strategies, such as problem-based and case-based learning, has further accentuated the need for faculty development programmes that not only teach new skills but also ensure their successful application(17,18). The LTSI has proven to be a valuable tool in identifying barriers and catalysts to learning transfer, enabling the design of impactful training programmes tailored to the unique needs of medical educators. This study focuses on identifying catalysts and barriers influencing the transfer of teaching skills from workshops to the workplace among medical teachers. By implementing the LTSI, this research aimed to uncover actionable insights into how individual, training designs, and workplace environments act as catalysts and barriers, and how they interact to support or impede skill application, as supported by the qualitative inquiry. In the literature, the LTSI surveys are rarely followed by a qualitative inquiry to in-depth explore the reasons for catalysts and barriers in the learning transfer of teaching skills. Hence, the qualitative inquiry helps in understanding the complex concept of learning transfer. Hence, the study aimed to identify the catalysts and barriers to the transfer of teaching skills from a formal faculty development workshop to the workplace, using the LTSI, and to explore the reasons for their perception as catalysts and barriers through detailed investigation from faculty perspectives. These findings will inform the design of future faculty development initiatives, ensuring that they not only impart knowledge but also foster its sustainable application in real-world teaching contexts.

This study sets out to answer the following research questions:

a. What are the catalysts and barriers in the learning transfer of teaching skills of medical faculty through a formal faculty development workshop to the workplace using LTSI.
b. How did medical faculty perceive the reasons for catalysts and barriers as strongly augmenting or significantly hindering learning transfer of teaching skills through a formal faculty development workshop to the workplace, using in-depth focus group discussion (FGD).

METHODS

Study Design

The study was conducted at Riphah International University Medical College. The study lasted six months. This study employed an explanatory sequential mixed-methods approach, in which quantitative data were initially gathered and then expanded upon with qualitative data. The integration of these methods allowed a thorough comprehension of the research problem (19). Phase one utilised a quantitative descriptive survey using LTSI, followed by a qualitative phase to explore in depth the lived experiences of medical faculty regarding the perceived catalysts and barriers to the transfer of learning at the workplace. The qualitative phase employed FGDs (20) with purposive sampling; hence, it best fits with the phenomenological design (21). The complex aspects of medical education, in which the transfer of learning is shaped by personal, organisational, and contextual factors, rendered the mixed-method design suitable. The quantitative survey provided a broad understanding, while the qualitative phase offered an in-depth perspective. This combination enhanced the validity and reliability of the results by focusing on the ‘what’ and ‘why’ of learning transfer. The approach taken in this research was systematic and strong, effectively addressing the research questions.

This study was conducted following a series of workshops, which were designed and conducted by the Department of Medical Education's experienced master trainers to train the basic and clinical medical sciences faculty members in 'facilitation skill' for case-based learning (CBL) and other workshop trainings, e.g., problem-based learning (PBL) facilitation skills. There was no difference between the design and structure of the two workshop training programmes. These trainings were selected because CBLs are the most widely used small-group teaching and learning strategy in an integrated undergraduate medical curriculum and are mandatory training for all levels of medical faculty. These trainings were conducted in a formal workshop format, which aligns with our aim of study. Such a study was appropriate for assessing learning transfer, the catalysts and barriers, and their effect on the performance of the proportion of faculty in the population. After this series of CBL training workshops and other training, the study examined the catalysts and barriers that affect the transfer of learning in medical education through a mixed-method sequential explanatory design (22).

The outcome of the workshop was to understand and apply the basic concepts, principles, and process of CBL in teaching basic and clinical medical sciences to undergraduate medical students, and to demonstrate the 'facilitation skill' in a simulated 'CBL session' using a given checklist. Regarding the structure of the workshops, they provided flexible learning opportunities for participants through a constructivist approach, with practical, hands-on experiences and role-play demonstrations of facilitation skills during small-group activities. Constructive feedback was provided by the master trainers on performance (23). The master trainers incorporated effective instructional methods in workshops, such as mini-lectures and videos that show the CBL process, roles, and feedback sessions, to prepare the faculty to become effective facilitators in CBL small-group sessions. According to Rudduck (24), the role of a tutor (master trainer) in training involves providing prompts rather than directives. Tutors are expected to pose open-ended questions and explore learners' prior knowledge to encourage the development of arguments and understanding, while also emphasising teamwork (25), supported by Jean Piaget's constructivist theory.

Sampling

The study population comprised medical faculty members from medical colleges across Pakistan. For this study, data were collected from a single medical college with 120 faculty members, comprising educators from both basic and clinical sciences, with roles spanning from junior lecturers to senior professors. All faculty members had previously participated in faculty development workshops conducted by the institution's Department of Medical Education master trainers before the study. The target sample in the study was faculty members who had attended faculty development workshops on CBL facilitation skills within the prior six months for preclinical or clinical medical sciences and who provided written informed consent to participate, including a briefing about the research project. Any faculty member who did not attend the workshops, recently joined the institution, refused to be part of this study, or was on sabbatical leave during the duration of this study was not considered for this study. Hence, it was a non-probability convenience sampling.

The medical college's faculty comprised 120 individuals. For the quantitative phase, before implementing LTSI, the researcher piloted it with 8 faculty members from diverse backgrounds to assess their understanding and alignment with local needs. The verbal feedback was collected, and it showed understanding of all questions and no ambiguity or cultural bias. After that, the LTSI questionnaire was sent to all faculty members to facilitate a cross-sectional investigation, with a detailed explanation of the LTSI. Of them, 107 (n = 107) completed the questionnaire, yielding a response rate of 89%.

The sample size for qualitative data collection through FGD was nine faculty members, purposively selected, and data collection continued until data saturation was achieved. Non-probability convenience sampling was employed for the quantitative phase, and all faculty members were offered an equal chance to participate in the survey, thereby improving generalisability (22). As for the qualitative part, purposive sampling with a maximum variation strategy was used to select the respondents: nine faculty members who had previously participated in the LTSI FGD, with a predetermined proportion of participants based on their faculty status and department. These faculty members were selected based on the criteria of a minimum of five years of teaching experience and above, with designations of associate professors (six in number) and professors (three in number), and were from anatomy, physiology, biochemistry, pathology, pharmacology, medicine, surgery, gynaecology, paediatrics, with a gender distribution of eight females and one male. Considering the downside of convenience sampling, the clearly defined study objectives, the adequate number of faculty in quantitative reporting, the use of a validated LTSI questionnaire, and adherence to accepted FGD protocols, the credibility of this study was increased (26). Ethical approval was obtained from the institutional ethical review committee and boards.

Data Collection and Analysis

The LTSI, utilised in the quantitative phase of the study, was developed by Holton et al. (27) and further refined in subsequent years, including contributions by Reid Bates and colleagues through extensive research (4,8,13,14). The LTSI is a widely used tool for assessing the factors that act as catalysts and barriers to learning transfer in organisational settings. It consists of 48 items, categorised into 16 factors, each representing catalysts and barriers to the effective transfer of learning to the workplace, along with 7 demographic questions. These factors included dimensions such as motivation, self-efficacy, peer support, supervisor support, transfer design, and organisational culture, among others. The inventory provided a comprehensive framework for understanding how various individual, training, and workplace catalysts and barriers interact to facilitate or hinder the application of learned skills.

Permission to use the LTSI for this study was obtained directly from Reid Bates via email. The inventory was tailored to the study's objectives and administered to participants, ensuring alignment with ethical standards and proper utilisation of the tool. For the qualitative phase, a structured questionnaire and FGD guide were developed to complement the quantitative findings. The FGD guide was designed to delve deeper into themes identified through the LTSI results, facilitating rich, contextualised insights into the catalysts and barriers influencing learning transfer. Questions focused on participants' experiences, challenges, and enablers in applying workshop-acquired skills to their professional roles. This mixed-method approach ensured a holistic understanding of the learning transfer process.

For quantitative data collection, the LTSI questionnaire was distributed to faculty members via email. Participants were given two weeks to complete the survey, with reminders sent to non-responders. Quantitative data analysis was carried out using Statistical Package for the Social Sciences (SPSS) version 19 to obtain descriptive statistics and assess the means of the study variables, including deviation and skewness. Normality of data was analysed using histograms for each factor. Categorical and demographic variables were also summarised by using descriptive statistics such as frequencies and percentages.

For the qualitative phase, FGDs were conducted in a neutral setting within the university, moderated by the principal investigator and an experienced facilitator, to minimise bias. The open-ended questions for FGD interviews were developed according to a specific

protocol (28), validated by experts, and piloted to assess participants' understanding and to gather in-depth data (29). For the FGD, verbal consent was obtained from the faculty to record for 90 minutes until data saturation was achieved. The protocol for FGD was followed using the Allison Tong, Peter Sainsbury, Jonathan Craig, and Consolidated Criteria for Reporting Qualitative Research (COREQ). The data were audio-recorded, transcribed verbatim, and manually thematically (30) analysed by two researchers. Qualitative data thematic analysis, as depicted in Figure 1, began with an initial reading of the interview transcripts for general understanding, followed by a second reading to identify key phrases, with inductive line-by-line coding in the third reading, thereby ensuring iterative analysis. Open coding was used to categorise the data into subthemes, which were then grouped into themes, while axial coding was used to investigate relationships among these themes. The concept of 'information power' (31) was used because, as claimed by Malterud et al. (32), one of the five key dimensions reflecting sample size in a qualitative study is the aim with the concept that our research question is narrow enough to require fewer highly specific participants. While analysing the data, trustworthiness was ensured by understanding the meaning of participants' lived experiences and by building connections between the transcribed and interpreted data (33). The four quality assurance criteria in qualitative research, i.e., credibility, dependability, transferability, and conformability, were assured (22). The credibility of data was done by debriefing about the research study to participants with their engagement, respondent validation of transcripts through member checking to enhance reliability of data, reflexivity by maintaining mutual collaboration with minimal interruption in FGD, constant comparative method among similar and different codes, and followed the qualitative data analysis protocol with triangulation of the research findings to enrich the study results making them more rigorous (22).

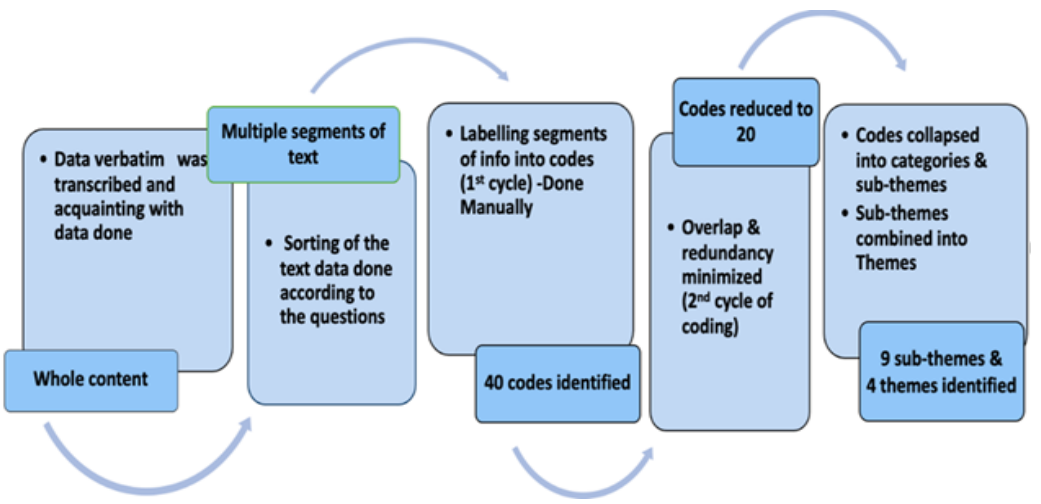


Figure 1: Data analysis flow chart for FGD.

RESULTS

Quantitative Findings

The study sample comprised 107 faculty members who completed the LTSI, with an overall reliability of 0.8 (Cronbach's alpha), of whom 73 (68.22%) were females and 34 (31.77%) were males, trained through the Department of Medical Education workshops. Most participants were aged 46–55 years (42.99%), followed by those aged 36–45 years (30.84%), while the

least represented age group was 25–35 years (11.21%). Regarding professional experience, the majority, 37 (34.57%), had 6 to 10 years, and 36 (33.64%) had 2 to 5 years, while none (0%) faculty had more than 20 years of experience. In terms of designation, the largest group included 34 (31.77%) professors, followed by 32 (29.90%) lecturers. Most participants attended workshops on 'CBL facilitation skills' (59, 55.1%), while others participated in workshops categorised as 'Any other workshop' (48, 44.9%), as depicted in Table 1, showing the demographic and other characteristics of the sample. Figure 2 shows that faculty are from basic and clinical medical sciences.

Table 1: Demographic characteristics of study sample (n = 107)

Variables	Number	%
Gender		
Male	34	31.77
Female	73	68.22
Age (years)		
25–35	12	11.21
36–45	33	30.84
46–55	46	42.99
56–65	16	14.95
Experience (years)		
2–5	36	33.64
6–10	37	34.57
11–15	22	20.56
16–20	12	11.21
Designation/level		
Lecturer	32	29.90
Assistant professor	29	27.10
Associate professor	12	11.21
Professor	34	31.77
Title of training		
Workshop/case-based learning	59	55.10
Workshop/any other course	48	44.90
Length of training (days)		
1–2	63	58.90
3–7	16	15.00
More than 7 days	28	26.20
Work-related training programmes		
1–3 programmes	62	57.90
4–6 programmes	29	27.10
7 or more programmes	16	15.00
Main goal for training		
Personal interest/growth	27	25.20
Job-related knowledge/skills	73	68.20
Required by employer	5	4.70
Job-related certification	2	1.90

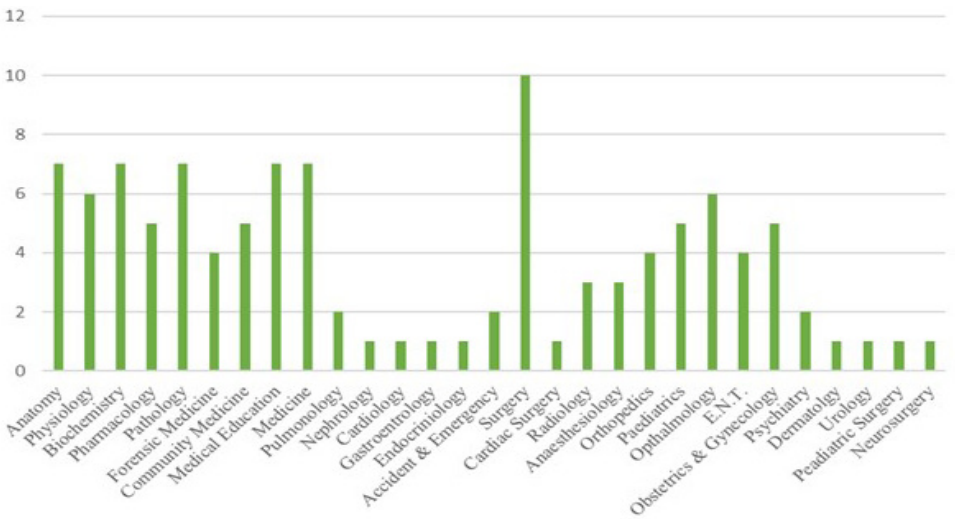


Figure 2: Distribution of educational departments of study sample.

Table 2 presents the LTSI scale scores in descending order, emphasising the mean scores for each domain. Higher mean scores reflect stronger dimensions within the transfer system, while lower scores highlight areas requiring improvement, with the cut-off value set at 3.75, the median score. Motivation-related variables, including Motivation to Transfer, Transfer Effort Performance Expectations, and Performance Self-Efficacy, exhibit the highest mean scores (above 4.0), underscoring their pivotal role as catalysts for effective learning transfer. Table 2 presents the mean values and standard deviations (SD) for catalyst and barrier factors.

Table 2: Overall scores on each domain of LTSI

16 Catalyst and barrier factors	Minimum	Maximum	Mean	Std. Error	Std. Deviation
Motivation to transfer	2.67	5	4.29	0.049	0.51
Transfer effort performance expectations	2.67	5	4.17	0.049	0.51
Performance self-efficacy	2.33	5	4.10	0.047	0.49
Transfer design	2.67	5	4.01	0.047	0.49
Opportunity to use	2.33	5	3.96	0.050	0.52
Peer support	1.00	5	3.91	0.064	0.66
Content validity	1.33	5	3.82	0.053	0.55
Performance outcome expectations	1.33	5	3.76	0.068	0.70
Learner readiness	1.67	5	3.75	0.063	0.65
Supervisor support	1.00	5	3.75	0.069	0.71
Performance coaching	1.33	5	3.33	0.082	0.85
Personal outcomes positive	1.00	5	3.29	0.088	0.91
Personal outcomes negative	1.00	5	2.95	0.073	0.76
Personal capacity (Negative scale)	1.00	5	2.70	0.082	0.85
Resistance change (Negative scale)	1.00	5	2.53	0.084	0.87
Supervisor's opposition (Negative scale)	1.00	5	2.10	0.076	0.78

Using a median score of 3.75 as a cut-off value to categorise the mean dataset into catalysts and barriers. The catalysts are those which are above the median value, while those below are classified as barriers, and it is supported by Holton et al. (27) prior studies based on median split. Basically, the mean scores are taken for categorisation into catalysts and barriers. Key catalysts include Transfer Design, Opportunity to Use, and Peer Support, which strengthen the learning transfer process. Conversely, the lowest-rated barriers include performance coaching, positive personal outcomes, and negative personal outcomes, which fall below the median and are identified as significant barriers to effective skill transfer. Additionally, certain negative scales, such as personal capacity, supervisor opposition, and resistance to change, are structured so that lower scores also indicate a healthier transfer system.

These findings provide valuable insights for designing an effective faculty development approach in a workplace-based context, focusing on leveraging strong catalysts and addressing barriers to optimise the transfer of learning from training to workplace practice.

Table 3 highlights the key catalysts that promote learning transfer in workplace settings. Motivation-related factors, such as motivation to transfer (4.29), transfer effort performance expectations (4.17), and performance self-efficacy (4.10), emerged as the strongest catalysts of skill transfer. Additionally, structural and contextual catalysts such as transfer design (4.01), opportunity to use (3.96), and peer support (3.91) facilitated the effective application of learned skills. Content validity (3.82) and performance outcome expectations (3.77) reinforce the alignment of training with workplace needs, while learner readiness (3.76) and supervisor support (3.75) emphasise the importance of preparedness and guidance in fostering skill application.

Table 3: Catalyst in learning transfer of skills at workplace

Catalysts	Mean	Interpretation
Motivation to transfer	4.2900	Strongly promotes learning transfer.
Transfer effort performance	4.1700	Promotes learning transfer effectively.
Performance self-efficacy	4.1000	A key strength in driving skill transfer.
Transfer design	4.0100	Facilitates skill application effectively.
Opportunity to use	3.9600	Enhance opportunities for implementing learned skills.
Peer support	3.9100	Provides a supportive environment for skill transfer.
Content validity	3.8200	Reinforces relevance of training to workplace needs.
Performance outcome expectations	3.7700	Encourages positive outcomes from skill transfer.
Learner readiness	3.7600	Indicates preparedness for learning transfer.
Supervisor support	3.7500	Highlights the role of supervisors in fostering skill application.
Personal capacity (negative scale)	2.7009	Indicates individual ability to learn a skill
Resistance change (negative scale)	2.5389	Reflects individual ability to sustain change
Supervisor's opposition (negative scale)	2.1059	Indicates supervisor opposition leads to demotivation to learn

Table 4 highlights barriers to the transfer of skills. Performance coaching (mean = 3.33) is identified as a weaker area that needs improvement to better support skill application. Similarly, personal outcomes positive (mean = 3.30) requires enhancement to function effectively as a catalyst. Personal outcomes negative (mean = 2.95) acts as a significant barrier, necessitating focused efforts to minimise its adverse impact on the transfer of learning.

Table 4: Barriers in the learning transfer of skills at workplace

Barriers	Mean	Interpretation
Performance coaching	3.33	Identified as a weaker area; requires improvement for better support.
Personal outcomes positive	3.30	Needs attention to strengthen as a motivator for skill transfer.
Personal outcomes negative	2.95	Acts as a barrier; requires focus to mitigate its impact on learning transfer.

Qualitative Findings

Nine faculty members participated in the FGDs session provided deep insights by identifying the reasons for the catalysts and barriers influencing the transfer of skills from workshops to the workplace. Four major themes and nine categories representing the catalysts and barriers emerged from FGD data analysis, as depicted in Figure 3 and Table 5, highlighting the complex interplay between individual, organisational, and environmental catalysts and barriers. The nine categories represent the catalysts and barriers influencing the transfer of skills from workshops to the workplace, grouped under four themes.

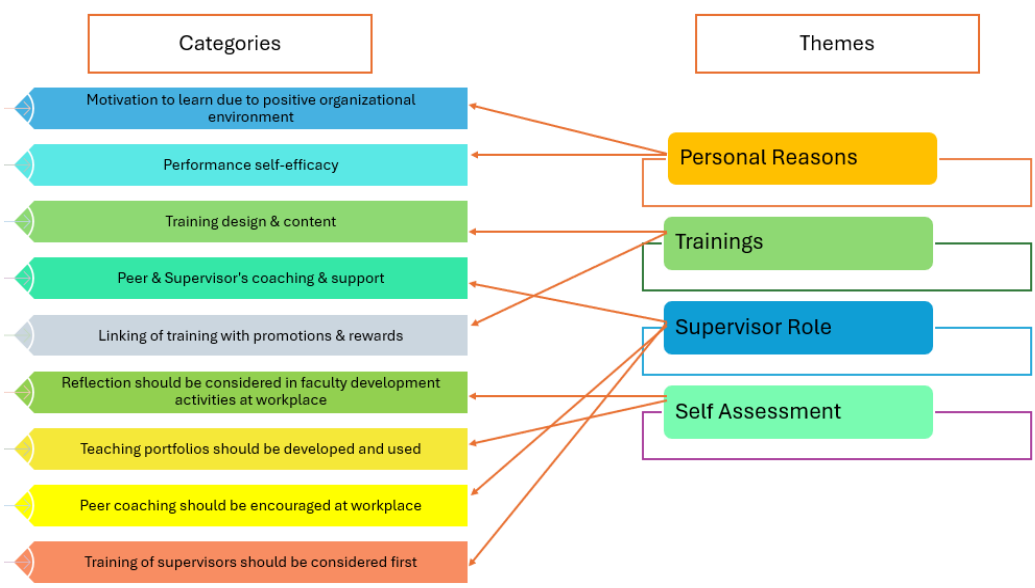


Figure 3: Themes and categories derived from FGD.

Thematic analysis, as shown in Table 5, reveals that learning transfer is influenced by a complex interaction among various catalysts and barriers, grouped into four themes: personal reasons, training design, the supervisor's role, and self-assessment. The table shows excerpts from the FGD that point to the creation of the categories.

Table 5: Themes and categories representing the catalysts and barriers

Categories	The excerpts of the FGD
Theme 1: Personal reasons	
Category 1: Motivation to learn due to positive organisational environment	I suggest that organisations must provide a positive culture by supporting the faculty to learn through training by providing them with time and budget. I think that motivation to learn and encouragement is purely related to organisation policies and procedures that should include the support system and time allocation for training and research.
Category 2: Performance self-efficacy	In my opinion self-efficacy is of the attribute and quality required for a medical to perform efficiently at workplace. I think hard and strategic effort lead to good self-confidence that leads to improving self-efficacy at workplace for medical faculty. I felt that high self-efficacy comes from one own perseverance, resilience, grit and determination.
Theme 2: Training	
Category 1: Training design and content	In my opinion, the training designs which follow the principles of adult learning lead to good learning transfer of skill and enhance the learning. I learned through hands-on activity with real workplace examples with role plays. I recommend that constructive feedback should be provided by the facilitator and peers during the hands-on activities which lead to learning retention and transfer at workplace.
Category 2: Linking training with promotions and rewards	In my opinion, training should be linked with annual performance appraisals and promotion through incorporating CPD point system. In my opinion, training should be linked and acknowledged with rewards and incentives in the form of cash awards and certificates. Trainings should be linked to rewards and incentives, like cash awards and certifications, to encourage skill application.
Theme 3: Supervisor's role	
Category 1: Peer and supervisor's coaching and support	In think supervisors/Heads of Departments (HOD) should coach to its faculty members with guidance, supervision, reflection, and feedback on learned skills at workplace, i.e., classrooms or clinical setting and this coaching will enhance the learning. In my opinion, supervisor/HOD is an empowered person by the institution and should provide support to attend the workshops and spare us from other duty.

(*continued on next page*)

Table 5. (*continued*)

Categories	The excerpts of the FGD
Category 2: Peer coaching should be encouraged at the workplace	In my view, peer coaching is a very powerful strategy to enhance learning because peers are always available at workplace and at our side, and I feel comfortable with them to observe us and provide feedback.
	I suggest that peer coaching should be used as a formal training strategy at workplace by the Department of Medical Education. Learning through peer coaching provide us to reflect on our mistakes and get prompt feedback for improvement, supervisor can be a peer coach.
Category 3: Training of supervisors should consider at first	In my suggestion, the Department of Medical Education should arrange training of trainer's programme for supervisors, and they should train in all necessary and new skills first so that they coach and support their faculty members.
	In my opinion, all supervisors/HODs trained through formal training programmes so that they are abreast with latest techniques and technology, and in this way, they can guide and coach us better.
Theme 4: Self-assessment	
Category 1: Reflection should be considered in faculty development activities at workplace	During our training (workshop), facilitator invites us for reflection on action, and while reflecting on my experience, I realise that there is room for improvement for my learning and that was helpful for my self-awareness and self-assessment.
Category 3: Teaching portfolios should be developed and used	In my opinion, reflection in action is powerful metacognitive strategy at workplace and should be used also at workplace.
	Faculty portfolios can be developed, and faculty can write their reflection on learning, this will help in keeping track of their own learning through, self-assessment and help in retention of learned skill.
	We have students' portfolios, but faculty portfolios can be developed, and faculty can be trained in its use, and this will help in faculty retention of learned skill with application at workplace.

By taking care of catalysts and barriers during the planning phase of training, learning transfer of learned skills at the workplace can be achieved. Positive catalysts, such as motivation to transfer, supportive organisational policies and climate, well-designed training programmes, and peer support, foster learning transfer, while barriers such as inadequate resources and untrained supervisors impede it. These are coinciding and supporting catalysts and barriers identified through LTSI and reflect integration between quantitative and qualitative findings. The following is a detailed exploration of qualitative findings depicting the catalyst and barrier factors, supported by direct participant quotes and relevant interpretations.

Theme 1: Personal reasons

This theme emerged from the two categories in Table 5: personal motivation driven by positive organisational culture, support, and individual self-efficacy. A positive organisational culture emerged as a crucial catalyst factor for learning transfer and motivation. Participants emphasised that time allocation, funding, and institutional support fostered an

environment conducive to the application of new skills. For instance, participants narrated that organisations must provide a positive culture by supporting the faculty to learn through training, offering time and budget for these activities. Another participant expressed that the impact of such support leads to motivation to learn and encouragement that are directly tied to organisational policies, especially the presence of a support system and dedicated time for training and research. Self-efficacy was repeatedly highlighted as a driving force for effective skill application. Participants linked self-efficacy to perseverance, grit, resilience, determination and strategic efforts to overcome challenges. Others emphasised that self-efficacy can be nurtured through structured activities and mentorship, illustrating its transformative potential for professional growth.

Theme 2: Training

The second theme categorised based on the training design and its content. Participants expressed that training designs that follow the principles of adult learning led to better learning transfer, enhanced workplace application, and greater impact. This included incorporating interactive elements, problem-solving tasks, and content relevance to daily responsibilities. They propose that training sessions that aligned closely with workplace tasks and challenges were seen as more beneficial. Participants called for greater customisation of training content to reflect the specific demands of medical educators. They narrate that hands-on activities and real-world scenarios within training sessions were critical tools for skill acquisition and retention. Moreover, they experienced that the role plays mirrored actual workplace situations. Moreover, they experienced that the role plays mirrored actual workplace situations. These methods allowed participants to visualise practical applications and reinforced learning through experiential techniques. Participants suggested that linking training outcomes with career incentives, such as promotions, appraisals, or certifications, could motivate faculty members to engage more actively in training programmes. Moreover, constructive feedback from facilitators and peers during training sessions played a vital role in reinforcing concepts and improving skill retention. The interactive nature of such sessions also encouraged active participation and continuous learning. The faculty expressed that constructive feedback from facilitators and peers during activities helped retain and transfer learning to the workplace. Participants also emphasised that the availability of resources and opportunities to practice newly acquired skills at the workplace was identified as a significant determinant of learning transfer. Participants noted that without institutional backing and infrastructure, implementing these skills remained a challenge.

Theme 3: Supervisor's role

The third theme emerged from three categories: peer and supervisor coaching and support, encouragement of peer coaching at the workplace, and the need for supervisor training. Faculty felt that a supervisor, as an expert, can act as a peer coach, and that this can emerge as a powerful strategy for skill reinforcement and reflective learning. Participants valued their expert peers' availability for immediate support and constructive feedback, suggesting the formalisation of this practice. They felt that peer coaching should be formally incorporated as a training strategy to allow reflection, feedback, and improvement. Peer coaching and collaborative learning emerged as a powerful strategy for skill reinforcement and reflective learning. Participants valued their peers' availability for immediate support and constructive feedback, suggesting the formalisation of this practice and expressed that peer coaching should be formally incorporated as a training strategy to allow reflection and improvement. Supervisors' role in skill transfer was recognised by the participants as pivotal in either facilitating or impeding skill application. Participants advocated supervisor training to ensure they are equipped with the latest tools and techniques to support their teams. Participants explained that supervisors should be formally trained to stay up to date with

modern techniques and technologies, enabling them to coach us effectively. Additionally, participants highlighted the importance of supervisors offering flexibility and support, such as freeing employees from additional duties to attend workshops.

Theme 4: Self-assessment

The fourth theme emerged from two categories: reflection and teaching portfolios. Reflection is a very good tool for self-assessment, and for continuous improvement. Reflection during and after training sessions was perceived as a powerful metacognitive strategy for self-awareness and growth. Participants recommended integrating reflective practices into both training programmes and workplace routines, and emphasised that reflection-in-action is a powerful metacognitive strategy that should also be utilised at the workplace. The inclusion of structured reflection exercises, such as journaling or facilitated discussions, was suggested to help participants identify gaps and track progress in applying new skills.

DISCUSSION

Initially, we employed the LTSI to evaluate the transfer of skills from the workshop to the workplace. This survey identifies the primary catalysts and barriers to learning transfer. Following the quantitative phase, FGDs were conducted to obtain qualitative insights into catalysts, barriers, and challenges to skill implementation in real-world contexts. To establish a comprehension of learning transfer in medical education, these approaches were combined.

The sample composition, predominantly female and within the age range of 46–55 years, aligns with trends observed in similar educational settings, where female educators often outnumber males due to gender dynamics in academia. Previous studies, such as those by Douglas et al. (34), also reported a higher representation of females in training programmes targeted at educational professionals (35). However, the age distribution in our study skews slightly older, with participants aged 36–45 being the largest group (34). This difference may reflect regional employment trends or institutional recruitment policies favouring senior faculty.

Motivation to Transfer was rated highest among the catalysts underscoring its pivotal role in learning transfer, as motivation to transfer is consistently identified as a significant predictor of learning transfer across various fields, including education and management (36,37). This is consistent with the findings of international and local studies, emphasising the centrality of motivation in skill application (38–41). Similarly, high scores for Transfer Effort Performance and Performance Self-Efficacy corroborate the work of Bredenkamp (37), who posited that self-efficacy enhances perseverance and goal achievement.

However, supervisor support and performance outcome received neutral ratings, diverging from studies by Ithnin et al. (39), which identified supervisor involvement as a critical determinant of learning transfer (42,43). This inconsistency might stem from institutional hierarchies or cultural differences, where supervisors are less actively engaged in their subordinates' skill development.

Identifying personal outcomes positive and personal capacity as moderate barriers to learning transfer highlights the significant role personal factors play in the efficacy of this process (44). In contrast, the low ratings for resistance to change and for supervisor opposition suggest a nuanced understanding of barriers across contexts. The personal

outcomes positive and personal capacity as moderate barriers align with the findings of Young (45), who noted that personal factors can influence the efficacy of learning transfer (44). However, low ratings for resistance to change and supervisor opposition contrast with prior research indicating these as significant barriers in some organisational contexts (38, 41). These disparities could be attributed to the supportive institutional policies reported during FGDs.

Regarding the thematic analysis of our FGDs, the emphasis on training designs that adhere to adult learning principles in this study aligns with Knowles' Andragogy Theory, which underscores the importance of relevance, problem-solving, and experiential learning in adult education (41). The high mean scores observed for Transfer Design in the current findings indicate that embedding these principles into training programmes can significantly enhance learning outcomes. These results are supported by empirical evidence suggesting that adult learners benefit from practical, learner-centred approaches (42). In addition, the observed emphasis on Performance Self-Efficacy in this study underscores the applicability of Bandura's Self-Efficacy Theory in predicting the successful application of acquired skills (41). Participants' insights into the importance of perseverance and resilience resonate with this framework, suggesting the potential to enhance training outcomes through structured mentorship and continuous feedback. This finding supports the role of tailored interventions in fostering participants' confidence and self-efficacy. The results further affirm the Transfer of Training Model proposed by Baldwin and Ford (46), with significant emphasis on environmental catalysts and barriers such as peer support and opportunity to use (47). Participants frequently highlighted these catalysts and barriers during FGDs, emphasising their critical role in facilitating the practical application of newly acquired skills. This underscores the necessity of implementing organisational policies that provide adequate resources and opportunities for practice, consistent with prior studies that emphasise the role of the workplace environment in training effectiveness. Neutral perceptions of personal outcomes positive and personal capacity for transfer as barriers could be attributed to variability in the relevance of training content to the participants' job roles (48). Participants may not have perceived a direct link between the skills acquired and their career progression or professional growth. This finding highlights the importance of designing customised training programmes tailored to the specific needs and aspirations of the target audience, ensuring that training outcomes are perceived as directly beneficial.

The practical implications of this study reinforce the value of tailoring training programmes to incorporate catalysts for learning transfer in the workplace and to avoid barriers. Incorporate adult learning principles, practical activities, and opportunities for reflection. Aligning training content with workplace needs can improve relevance and application, as highlighted by participants' suggestions. Organisations can enhance learning transfer by fostering a supportive culture, allocating time and resources, and formalising peer-coaching mechanisms. Training supervisors to act as effective mentors can further strengthen skill application.

Limitations

This study acknowledges its strengths and limitations, and the generalisability of the findings depends on individual institutional context. A major strength of the study is its explanatory sequential mixed-method design, in which limitations of the quantitative phase are counterbalanced by the qualitative findings. However, this study was conducted in a single institution, which affects its context and culture, and every institution's context varies,

with little variation in catalysts and barriers that promote and hinder the transfer of learning into workplace skills. Moreover, the qualitative data were collected during the COVID era through only one FGD, and recruiting participants for additional FGDs was challenging, as required for interpretive phenomenological data iteration.

CONCLUSION

The study results highlight the complexity of skill transfer in staff development, reinforcing the notion that the training transfer process is inherently dynamic. The nature of skill transfer practice necessitates a systematic approach to elucidate the roles and impacts of the various influencing catalysts and barriers identified in this context. Participants' perspectives highlight that individual motivation, organisational support, and training design significantly influence the transfer of skills in practice. The current findings suggest important considerations for healthcare managers and policymakers, emphasising the need for context-specific training activities tailored to specific job requirements and for incorporating problem-solving and participatory methods to enhance training effectiveness.

This research demonstrates the significance of peer support and supervisor encouragement in achieving training success, asserting that a conducive transfer environment is essential for positive training outcomes. Additional measures involve integrating the acquired knowledge into the organisation's performance management systems, facilitating the application of skills during performance evaluations and reward mechanisms. The acquisition of knowledge is as important as providing resources, time, and structured practice for employees to apply that knowledge. To improve the transfer process, it is essential to minimise barriers, such as insufficient commitment from supervisors and constraints on decision-making within roles. Furthermore, developing an integrated and consistent organisational culture that promotes the application of acquired skills while fostering a learning-oriented, adaptable environment is essential for the sustained transfer and application of these skills. It is recommended that future research explore other less-studied enablers in greater detail, such as resistance to organisational change, and implement alternative prescribed strategies for managing these barriers. This will ensure that training effectively supports professional development and fosters positive organisational change.

ACKNOWLEDGEMENTS

There were no financial benefits or grants availed of; however, Riphah Academy of Research and Education (RARE), provided the resource material support. We acknowledge the help of staff of Riphah Academy of Research and Education for organising the sessions in coordination with medical college with provision of tea breaks.

ETHICAL APPROVAL

This study was approved by the medical institution's Ethical Review Committee of Health Sciences Faculty, Universiti Sains Malaysia (USM/JEPeM/19050289) and Riphah International University Board of Advanced Studies and Research (Appl.#Riphah/IRC/0366). All participants signed a written informed consent form.

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