

Developing Facilitation Competence through Reflective Problem-Based Learning: A Qualitative Design-Based Case Study in Higher Education

ISAK RAJJAK SHAIKH

isak.rajjak@gmail.com

SLU: Sveriges lantbruksuniversitet <https://orcid.org/0000-0003-2157-6538>

Research Article

Keywords: Problem-Based Learning (PBL), Facilitation, Reflective Practice, Educational Communication (EC), Group Dynamics, Psychological Safety, Higher Education Institution (HEI)

Posted Date: August 12th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10664263/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: The authors declare no competing interests.

Developing Facilitation Competence in Higher Education through Reflective Problem-Based Learning

Isak Rajjak Shaikh^{1,2,3*}

¹ Swedish University of Agricultural Sciences (SLU), P.O. Box 7070, Uppsala, SE-750 07, Sweden (Facilitation of Groups in Higher Education – the pilot course coordinated by the Didacticum vid Linköpings, Linköping Universitet, Linköping, SE-581 83, in a consortium setting with SLU, Karolinska Institutet, Liu, Mälardalens Universitet, and Blekinge Tekniska Högskola, Sweden), Linköping Universitet, Linköping, SE-581 83 Sweden.

² Razaaq University Consortium, Paulsgatan 8 D, 214 46 Malmö, Sweden

³ Razak Institution of Skills, Education & Research (RISER), Nanded – 431 605, India

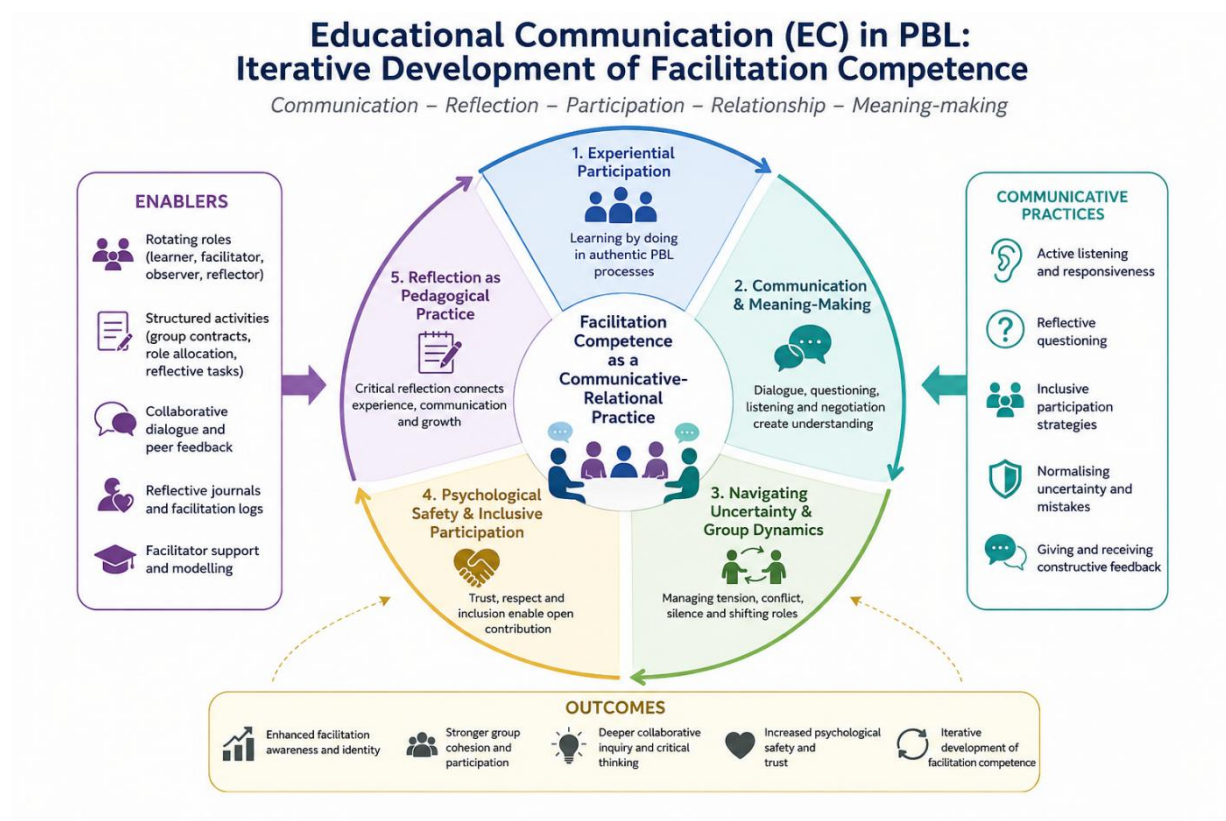
* Correspondence via <isak.rajjak@gmail.com> <isak@razaaq.se>

Abstract

Problem-Based Learning (PBL) is increasingly used in higher education to support collaborative learning, reflective practice, communication, and critical inquiry. Despite its pedagogical strengths, collaborative learning environments frequently encounter challenges related to group dynamics, uneven participation, uncertainty, and facilitation competence, while also raising questions about how collaborative inquiry supports access to disciplinary knowledge. This study explores how educators develop facilitation competence through participation in a reflective PBL-based professional development course implemented across a consortium of Swedish higher education institutions. The study employed a qualitative design-based case study approach informed by sociocultural learning theory, group development theory, psychological safety, and the Community of Inquiry (CoI) framework. Reflexive thematic analysis was used to analyse reflective journals, facilitation logs, webinar discussions, peer feedback, collaborative group documentation, and facilitator observations. The findings indicate that facilitation competence develops through iterative cycles of participation, reflection, communication, and experiential engagement in collaborative group processes. Participants demonstrated increased awareness of group dynamics, psychological safety, reflective dialogue, and communicative facilitation practices. Reflection functioned simultaneously as a pedagogical strategy, a professional learning mechanism, and a source of analytical insight. The study introduces Educational Communication (EC) as a communicative

and relational analytical lens and extends its conceptualisation by identifying an epistemic dimension concerned with maintaining attention to disciplinary knowledge within collaborative inquiry. The findings contribute to higher education research by proposing a transferable reflective model of facilitation development while identifying epistemic facilitation as an important area for future empirical investigation.

Keywords: Problem-Based Learning (PBL); Facilitation; Reflective Practice; Educational Communication (EC); Group Dynamics; Psychological Safety; Higher Education Institution (HEI)



Graphical Abstract Figure. Educational Communication (EC) in PBL: An Expanded Model of Facilitation Competence

Conceptual model illustrating how facilitation competence develops iteratively through participation in collaborative inquiry, reflective dialogue, communicative interaction, feedback processes, and experiential engagement within Problem-Based Learning (PBL) environments. The model demonstrates how Educational Communication (EC), psychological safety, group dynamics, and reflective practice interact to support relational, communicative, reflective, adaptive, and inclusive facilitation competence. The expanded model additionally identifies an epistemic dimension of facilitation concerned with maintaining attention to disciplinary

knowledge within collaborative inquiry. This epistemic dimension is presented as a theoretical extension of the facilitation competence model and as an area requiring further empirical investigation.

1. Introduction

Higher education is increasingly characterised by collaborative, student-centred, and inquiry-oriented pedagogical approaches designed to strengthen critical thinking, communication, teamwork, and reflective learning. Active learning environments have become central to contemporary higher education because students benefit from engaging in dialogue, reflection, collaboration, and authentic problem-solving rather than passive reception of information (Freeman et al., 2014; Vygotsky, 1978). Within this pedagogical shift, Problem-Based Learning (PBL) has emerged as a widely recognised educational approach that positions learners as active participants in collaborative inquiry processes (Barrows & Tamblyn, 1980; Barrows, 1996; Hmelo-Silver, 2004).

PBL is grounded in constructivist and sociocultural understandings of learning in which knowledge develops through participation, interaction, and shared meaning-making. Research has demonstrated that PBL can strengthen critical thinking, collaborative learning, self-directed learning, reflective capacity, and long-term knowledge retention (Dolmans et al., 2005; Hmelo-Silver, 2004). Collaborative learning environments also provide opportunities for learners to develop transferable competencies such as communication, facilitation, teamwork, negotiation, and problem-solving. At the same time, sociocultural and collaborative learning perspectives suggest that disagreement, negotiation, uncertainty, and conflict are not necessarily barriers to learning. Instead, they may contribute to deeper reflection, critical engagement, and collaborative knowledge construction when effectively facilitated (Johnson & Johnson, 2009; Vygotsky, 1978). Collaborative learning environments are nevertheless inherently complex. Group work frequently involves uneven participation, interpersonal tensions, uncertainty, communication difficulties, and negotiation of roles and responsibilities. Such challenges foreground the importance of facilitation competence in collaborative higher education environments. However, the pedagogical strengths of PBL and student-centred learning have also been subject to important theoretical criticism. Social realist scholars have questioned whether approaches that privilege learner experience, collaboration, and socially constructed meaning-making necessarily provide sufficient access to systematic disciplinary knowledge.

Wheelahan (2010), drawing on social realist and Bernsteinian perspectives, argues that educational approaches may become “knowledge poor” when access to theoretical knowledge is displaced by an exclusive emphasis on learner experience, competencies, or immediate relevance. From this perspective, students’ prior and experiential knowledge is valuable, but it may have limited explanatory power when it is not connected to the conceptual structures of disciplinary knowledge. Bernstein’s (2000) distinction between horizontal and vertical discourse further highlights the difference between context-dependent forms of everyday knowledge and more systematic forms of knowledge that enable phenomena to be explained and understood across contexts. Related social realist perspectives have therefore emphasised the importance of ensuring that educational practices provide meaningful access to disciplinary knowledge while recognising the value of learners’ existing experiences and contributions.

This critique does not imply that collaborative or student-centred pedagogies should be rejected. Rather, it raises an important question about how such pedagogies can be facilitated in ways that support both meaningful participation and access to disciplinary knowledge. In PBL environments, this question is particularly important because collaborative inquiry may generate valuable experiential, contextual, and emerging forms of understanding, but these forms of understanding do not necessarily develop automatically into systematic disciplinary knowledge. The role of facilitation therefore extends beyond supporting participation, communication, and group processes to include attention to what kinds of knowledge are being constructed, what conceptual gaps or misconceptions may emerge, and how learners may be supported in connecting initial or experiential understandings with more systematic disciplinary explanations. In this study, we refer to this additional dimension as the epistemic dimension of facilitation competence. Importantly, this dimension is introduced as a theoretical extension of the facilitation competence model rather than as an empirically established outcome of the present study.

Facilitation therefore extends beyond organisational management and cannot be reduced to content expertise alone. It involves supporting communication, participation, reflective dialogue, psychological safety, collaborative meaning-making, and group development while maintaining attention to the knowledge emerging through collaborative inquiry. Despite the increasing implementation of collaborative pedagogies, many higher education educators receive limited formal preparation in facilitation or group dynamics (Dolmans et al., 2005). This creates a need to understand how educators develop the relational, communicative,

reflective, adaptive, and epistemically attentive capacities required to facilitate collaborative learning environments effectively.

This study examines a pilot professional development course entitled *Facilitation of Groups in Higher Education (Facilitering av Grupper i Högre Utbildning)*, coordinated by Didacticum at Linköping University and implemented in collaboration with several Swedish higher education institutions. The course aimed to strengthen facilitation competence, reflective practice, collaborative learning, and group process management through experiential participation in PBL. The study introduces Educational Communication (EC) as a communicative and relational analytical lens for understanding how participation, reflection, facilitation, interaction, and collaborative meaning-making shape learning processes within PBL environments. EC also foregrounds the epistemic dimension of educational interaction: communication is not merely the medium through which participants establish relationships and construct shared meanings, but also the means through which disciplinary concepts are introduced, questioned, clarified, connected, and progressively recontextualised through collaborative inquiry. In this sense, EC conceptualises educational communication as simultaneously relational, communicative, reflective, inclusive, and epistemic:

Educational Communication (EC) – a model presented here is
relational,
communicative,
reflective,
inclusive, and
epistemic.

Building on the social-realist critique, the present study further develops this conceptualisation by identifying an epistemic dimension of facilitation concerned with sustaining attention to disciplinary knowledge while enabling collaborative inquiry. This dimension highlights the facilitator's role not only in supporting participation and interaction, but also in keeping disciplinary concepts visible, connected, and open to critical examination as learners collectively construct and recontextualise knowledge.

The study addresses the following research questions:

1. How do educators experience learning within a reflective PBL-based facilitator training course?

2. How does participation in collaborative group processes contribute to facilitation competence development?
3. What role does reflection play in facilitation learning and professional identity formation?
4. How can Educational Communication (EC) help explain collaborative learning processes in higher education?

This study contributes to higher education research by:

- (i) developing Educational Communication (EC) as an analytical lens for facilitation in collaborative learning contexts;
- (ii) conceptualising facilitation competence as reflective, communicative-relational, and attentive to the epistemic conditions of collaborative learning; and
- (iii) proposing a transferable reflective model for facilitation-focused Continuing Professional Development (CPD), while identifying epistemic facilitation as an area requiring further empirical investigation.

Despite increasing implementation of collaborative pedagogies in higher education, facilitation competence development remains underexplored, particularly regarding how educators learn facilitation through reflective participation in collaborative PBL environments. Existing research frequently focuses on student learning outcomes rather than facilitation learning processes, communicative interaction, and reflective professional development. Moreover, less attention has been given to how facilitation can simultaneously support participation, psychological safety, collaborative meaning-making, and attention to disciplinary knowledge. This study addresses this gap by examining facilitation competence development through the analytical lens of Educational Communication (EC) and by extending the conceptualisation of facilitation competence to include an epistemic dimension that can be examined more directly in future research.

2. Literature Review

2.1 Problem-Based Learning and Collaborative Learning

Problem-Based Learning (PBL) is a student-centred pedagogical approach in which learning emerges through collaborative engagement with authentic and complex problems (Barrows & Tamblyn, 1980; Barrows, 1996). PBL positions learners as active participants in inquiry-oriented processes involving discussion, reflection, communication, and collaborative problem-solving. Research has demonstrated that PBL can strengthen critical thinking, self-directed learning, communication, collaboration, and reflective practice (Dolmans et al., 2005; Hmelo-Silver, 2004). Collaborative learning is central to PBL because learning develops through interaction, participation, and dialogue rather than through individual knowledge acquisition alone.

Collaborative learning processes are nevertheless characterised by uncertainty, uneven participation, interpersonal tensions, and communication difficulties. These challenges highlight the importance of facilitation in collaborative educational environments. Research on collaborative learning design further emphasises the importance of structured group tasks, interdependence, and communicative participation in supporting meaningful collaboration (Barkley et al., 2005; Cohen & Lotan, 2014). Recent higher education research also highlights the growing importance of facilitation practices in digitally mediated collaborative learning environments where communication and group cohesion may be influenced by technological conditions (Kovari, 2025). Collaborative learning research also emphasises the importance of “group-worthy tasks” that require interdependence, shared responsibility, and collaborative inquiry rather than simple task division (Lotan, 2014). Research on cooperative and collaborative learning further emphasises that meaningful group learning requires intentional facilitation, structured interaction, and clearly designed collaborative tasks rather than simple division of work (Barkley et al., 2005; Felder & Brent, 2007). Studies examining teachers’ experiences with cooperative learning suggest that facilitation practices play an important role in supporting participation, communication, accountability, and reflective engagement within groups (Gillies & Boyle, 2013). Group effectiveness further develops progressively through interaction, trust-building, and evolving communication patterns, highlighting the importance of facilitation strategies that support group cohesion, participation, and collaborative inquiry over time (Wheelan, 2022). These perspectives reinforce the argument that collaborative learning environments require communicative and relational facilitation practices that actively support participation and collective meaning-making.

2.2 Group Dynamics and Psychological Safety

Group dynamics provide an important framework for understanding collaborative learning processes. Tuckman's (1965) model of group development conceptualises group formation as a dynamic process involving forming, storming, norming, and performing. Collaborative groups frequently encounter uncertainty, disagreement, negotiation, and interpersonal tension, particularly during early stages of development.

Psychological safety is particularly important in collaborative educational settings. Edmondson and Lei (2014) define psychological safety as a shared belief that a group is safe for interpersonal risk-taking. In educational contexts, psychological safety supports questioning, reflective dialogue, participation, and constructive disagreement.

Research further suggests that trust, group composition, and cultural diversity may significantly influence collaborative engagement and participation within higher education group work (Poort et al., 2020). These findings reinforce the importance of facilitation practices that support inclusion, communicative openness, and equitable participation. Collaborative communication may become more complex in digitally mediated learning environments where reduced non-verbal interaction can influence participation, communicative clarity, and group cohesion.

2.3 Facilitation and Reflective Practice

Facilitation in collaborative and PBL environments should be understood as a relational practice shaped through communication, participation, reflection, and group interaction rather than merely as instructional management. Facilitation competence develops not only through theoretical preparation but also through experiential engagement with authentic group processes, uncertainty, negotiation, and reflective dialogue (Dolmans et al., 2005; Hmelo-Silver, 2004). Facilitation differs from traditional teacher-centred instruction because it emphasises communication, participation, collaborative inquiry, and learner engagement rather than content transmission alone. Facilitation competence therefore includes relational, reflective, and communicative dimensions in addition to pedagogical and organisational competencies. Reflection is central to facilitation development because it enables educators to critically examine assumptions, communication practices, interaction patterns, and pedagogical choices. Structured reflective activities such as journals, peer dialogue, collaborative feedback, and facilitation logs may further support facilitation learning. Recent facilitation research further emphasises the importance of structured questioning, reflective dialogue, and process-oriented facilitation strategies in small-group collaborative learning environments (D'Eon & Zhao, 2022).

2.4 Educational Communication

Educational Communication (EC) is conceptualised in this study as the communicative and relational process through which learning, participation, reflection, and collaborative meaning-making are co-constructed within educational environments. EC functions as an analytical lens for understanding how communication, dialogue, facilitation, participation, and psychological safety shape collaborative learning processes in PBL settings. The concept aligns with the Community of Inquiry framework developed by Garrison et al. (2000), which conceptualises meaningful learning as emerging through the interaction of teaching presence, social presence, and cognitive presence. Educational Communication positions communication as central to collaborative learning and facilitation development. Communication shapes participation, influences psychological safety, supports reflection, and enables collaborative meaning-making within groups.

2.5 Research Gap and Conceptual Positioning

Existing literature has extensively examined collaborative learning, PBL, reflective practice, and facilitation separately. However, fewer studies examine how facilitation competence develops through communicative participation within collaborative higher education environments. Moreover, facilitation is frequently treated as a pedagogical technique rather than as a communicative and relational practice. This study contributes by conceptualising Educational Communication (EC) as an analytical lens for understanding facilitation development, collaborative inquiry, and reflective participation within PBL-based higher education contexts. Communication within facilitation processes may also be understood as a form of relational and social influence shaping participation, collaboration, and group engagement (Ruben & Gigliotti, 2016).

A further unresolved issue concerns the epistemic dimension of facilitation. While collaborative and student-centred approaches emphasise participation, dialogue, learner agency, and shared meaning-making, less attention has been given to how facilitators support movement from participants' initial or experiential understandings toward more systematic disciplinary knowledge. Social realist critiques raise the possibility that collaborative learning may become knowledge poor when learners' contributions are not sufficiently connected to disciplinary concepts and explanatory structures (Bernstein, 2000; Wheelahan, 2010). This study therefore extends the conceptualisation of facilitation competence beyond relational and communicative

processes to include an epistemic responsibility: supporting collaborative participation while maintaining attention to the quality, structure, and development of disciplinary knowledge.

3. Theoretical Framework

This study is informed by sociocultural learning theory (Vygotsky, 1978), group development theory (Tuckman, 1965), psychological safety (Edmondson & Lei, 2014), Self-Determination Theory (SDT), and the Community of Inquiry framework (Garrison et al., 2000).

Sociocultural learning theory conceptualises learning as socially situated and mediated through interaction, communication, and participation. From this perspective, facilitation competence develops through collaborative engagement, reflective dialogue, and participation in authentic learning practices rather than through isolated acquisition of instructional techniques.

Group development theory supports understanding of collaborative learning as a dynamic process involving negotiation, uncertainty, evolving participation, and interpersonal interaction. Tuckman's (1965) model of forming, storming, norming, and performing provides a useful framework for understanding how facilitation competence develops through engagement with authentic collaborative dynamics.

Psychological safety further informs the study's understanding of collaborative participation and facilitation development. Edmondson and Lei (2014) emphasise that psychologically safe environments support participation, questioning, reflective dialogue, and constructive disagreement. Within collaborative higher education settings, psychological safety becomes particularly important for sustaining inclusive participation and communicative openness.

The Community of Inquiry framework (Garrison et al., 2000) additionally informs the study by emphasising the interaction between teaching presence, social presence, and cognitive presence in collaborative educational environments. This framework supports analysis of how facilitation, communication, reflection, and collaborative inquiry interact within PBL processes. Recent reviews of the Community of Inquiry framework further demonstrate its relevance for collaborative and digitally mediated higher education environments, particularly regarding the relationship between social presence, reflective dialogue, and meaningful participation (Stenbom, 2018).

Facilitation in collaborative learning environments may also be understood through Self-Determination Theory (SDT), which emphasises autonomy, competence, and relatedness as

central conditions for meaningful engagement and intrinsic motivation (Deci & Ryan, 2017). Within PBL environments, facilitation practices that support learner agency, collaborative participation, and psychologically safe interaction may strengthen both motivation and reflective engagement. This perspective further aligns with Educational Communication (EC), where communicative interaction supports relational participation and collaborative meaning-making. Together, these theoretical perspectives support the conceptualisation of Educational Communication (EC) as a communicative and relational process through which facilitation competence develops through participation, interaction, reflection, and collaborative meaning-making within collaborative PBL environments. The conceptual relationships between Educational Communication (EC), facilitation competence, psychological safety, reflective practice, and collaborative inquiry are illustrated in Figure 1.

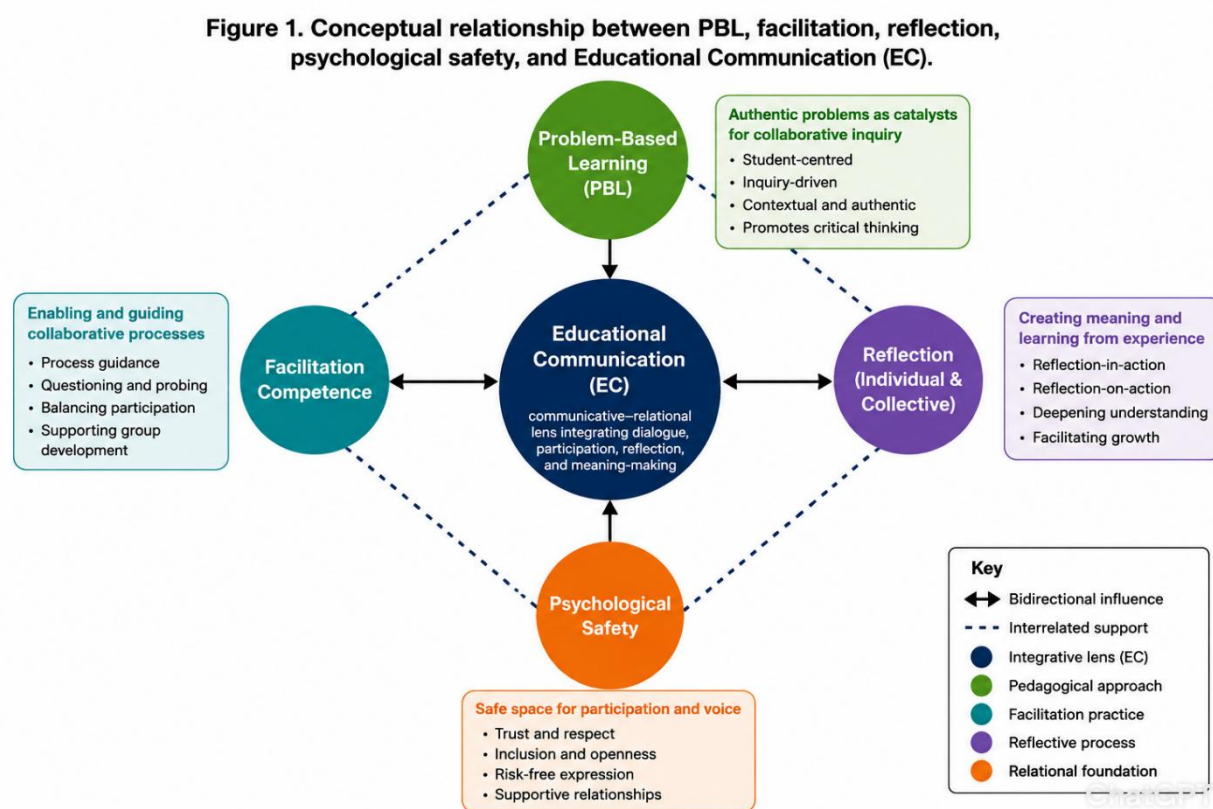


Figure 1 Conceptual relationship between PBL, facilitation, reflection, psychological safety, and Educational Communication (EC)

Social Realist Theory of Knowledge: Social realist perspectives introduce a complementary epistemic dimension to the sociocultural account adopted in this study. Whereas sociocultural perspectives emphasise learning through participation, interaction, communication, and socially mediated activity, social realist perspectives draw attention to the nature, structure, and

explanatory power of the knowledge made available through educational processes. Wheelahan (2010), drawing on Bernsteinian sociology, argues that equitable access to theoretical knowledge is central to educational purposes because experiential or context-dependent knowledge does not necessarily provide the conceptual resources required to explain phenomena across contexts. For the present study, this perspective does not displace the sociocultural understanding of learning; rather, it introduces an important question concerning what learners gain through collaborative participation. Facilitation competence therefore requires attention both to the relational conditions under which learning occurs and to the epistemic quality and disciplinary development of the knowledge being constructed. Bernstein's (2000) distinction between horizontal and vertical discourse further supports this distinction. Learners may contribute valuable context-dependent experiential knowledge to collaborative discussion, but such knowledge does not automatically become systematic disciplinary knowledge. The facilitator's role therefore includes helping learners connect their contributions to disciplinary concepts, explanatory frameworks, and more generalisable forms of understanding.

4. Methodology

4.1 Research Design

This study employed a qualitative design-based case study approach to explore how educators developed facilitation competence through participation in a reflective PBL-based professional development course in higher education. A qualitative case study design was considered appropriate because the study sought to examine pedagogical, communicative, and relational processes within an authentic educational context (Merriam & Tisdell, 2016; Yin, 2018). The study was informed by an interpretivist epistemological perspective recognising that meaning and knowledge are socially constructed through interaction, communication, and reflection.

4.2 Research Context

The empirical context consisted of a pilot course entitled *Facilitation of Groups in Higher Education (Facilitering av Grupper i Högre Utbildning)*, coordinated by Didacticum at Linköping University in collaboration with several Swedish higher education institutions. The course was developed as a Continuing Professional Development (CPD) initiative designed to strengthen facilitation competence, collaborative pedagogy, reflective practice, and group

process management in higher education. The pedagogical design combined synchronous webinars, asynchronous collaboration, reflective journaling, peer feedback, rotating facilitation roles, and collaborative group activities grounded in PBL principles (Table 1).

Table 1 Overview of Course Design and Learning Activities

Component		Description
Pedagogical approach		Problem-Based Learning (PBL)
Learning format		Collaborative and reflective learning
Activities		Webinars, reflective journals, peer feedback, facilitation exercises
Facilitation model		Rotating facilitator roles
Group structure		Small tutorial groups
Learning mode		Synchronous and asynchronous
Structured interaction practices		Group contracts, reflective questioning, collaborative feedback
Course purpose		Facilitation competence development

4.3 Participants

Participants included university teachers, supervisors, educational developers, researchers, and higher education professionals from participating Swedish institutions. Participants worked in tutorial groups consisting of approximately six to eight members and alternated between learner, facilitator, observer, and reflective roles throughout the course. Participation in the research component was voluntary, and all data used for analysis were anonymised ((Table 2a; Table 2b).

Table 2a Participant Profile and Institutional Representation

Participant Category	Number
University or college teachers	09

Participant Category	Number
Educational developers	03
Researchers	03
Supervisors	04
Other higher education professionals	01
Total participants	20

Table 2b The Expanded Version of Participant Profile and Institutional Representation

Characteristic	Details
Total participants	20
Participant roles	University teachers, educational developers, researchers, supervisors, and other higher education professionals
Institutional representation	Swedish University of Agricultural Sciences (SLU), Linköping University, Karolinska Institutet, Mälardalen University, and Blekinge Institute of Technology
Group structure	Tutorial groups of approximately 6–8 participants
Participation model	Rotating learner, facilitator, observer, and reflective roles
Sampling strategy	Purposeful sampling
Context	Professional development course in higher education facilitation

4.4 Data Collection

Data were collected through reflective journals, facilitation logs, peer feedback, webinar discussions, collaborative group notes, facilitator observations, and course documentation. Reflective journals constituted a central source of data because they captured participants' evolving understanding of facilitation, communication, group dynamics, and collaborative learning. Facilitation logs and peer feedback provided insight into communicative practices,

facilitation strategies, participation patterns, and collaborative interaction within groups (Table 3 & Table 4).

Table 3 Overview of Qualitative Data Sources

Data Source	Purpose
Reflective journals	Reflection on facilitation learning
Facilitation logs	Documentation of facilitation practice
Peer feedback	Collaborative reflection and dialogue
Webinar discussions	Interaction and collaborative inquiry
Group notes	Documentation of collaborative processes
Facilitator observations	Contextual and process-oriented insight
Course documentation	Pedagogical and organisational context

Table 4 Educational Communication (EC) as an Integrative Framework for Facilitation Competence Development in PBL Environments

Dimension	Key Characteristics	Role in Facilitation Development	Connection to Educational Communication (EC)
Problem-Based Learning (PBL)	Student-centred inquiry, authentic problems, collaborative learning, experiential engagement	Creates the pedagogical environment in which competence develops through participation and interaction	EC positions communication as central to collaborative inquiry and meaning-making within PBL contexts
Reflective Practice	Reflection-in-action, reflection-on-action,	Supports examination of facilitation	critical EC integrates reflective of dialogue as part of communicative and

Dimension	Key Characteristics	Role in Facilitation Development	Connection to Educational Communication (EC)
	self-awareness, experiential learning	communication patterns and group interaction	relational learning processes
Psychological Safety	Trust, openness, inclusion, safe participation, supportive relationships	Enables participants to express uncertainty, contribute ideas, and engage in collaborative inquiry	EC emphasises communication conditions that support participation, inclusion, and relational engagement
Group Development	Negotiation, conflict navigation, uncertainty management, evolving group dynamics	Develops facilitators' ability to manage collaboration, participation, and interpersonal processes	EC frames group interaction as a communicative process and shaping collaborative learning and facilitation
Collaborative Meaning-Making	Dialogue, co-construction of knowledge, interaction, shared understanding	Encourages facilitation through participatory and dialogical engagement, rather than instructional control	EC conceptualises communication as the mechanism through which collaborative understanding is developed
Facilitation Competence	Relational, communicative, reflective, adaptive, inclusive, and epistemically responsible facilitation practices	Represents developmental outcome of participation within collaborative PBL environments	EC provides the integrative communicative-framework explaining how facilitation competence develops

Dimension	Key Characteristics	Role in Facilitation Development	Connection to Educational Communication (EC)
Epistemic Facilitation	Disciplinary knowledge, conceptual understanding, identification of knowledge gaps, misconception checking, connection between experiential and disciplinary knowledge	Helps facilitators monitor what knowledge is being developed, identify gaps, support movement from initial or experiential understandings toward more systematic disciplinary explanations	EC connects dialogue and participation with the epistemic conditions through which learners encounter, question, refine, and recontextualise disciplinary knowledge

4.5 Data Analysis

The data were analysed using reflexive thematic analysis informed by Braun and Clarke's (2006) six-phase approach:

1. familiarisation with the data,
2. initial coding,
3. theme development,
4. thematic refinement,
5. interpretive synthesis,
6. and theoretical integration.

The coding process combined inductive and theoretically informed approaches. Initial themes emerged from participant reflections and collaborative experiences, while interpretation was informed by sociocultural learning theory, PBL theory, group development theory, psychological safety, the Community of Inquiry framework, and Educational Communication.

Particular analytical attention was directed toward:

- facilitation identity formation,
- communication practices,

- collaborative learning,
- reflective processes,
- group development,
- psychological safety,
- participation,
- and collaborative meaning-making.

Themes were refined iteratively through continuous comparison between empirical material, theoretical interpretation, and emerging conceptual understanding. Educational Communication (EC) functioned as an interpretive lens through which communicative interaction, facilitation practices, and collaborative meaning-making were analysed relationally rather than solely behaviourally.

4.6 Trustworthiness

Methodological triangulation was employed through the use of multiple qualitative data sources. Credibility was strengthened through prolonged engagement with the educational context and iterative comparison between data, themes, and theoretical interpretation. Dependability was supported through systematic documentation of analytical procedures and thematic development. Transferability was strengthened through contextual description of the educational setting, participant structure, pedagogical design, and collaborative learning processes. Reflexive awareness was maintained throughout the research process in order to critically consider interpretation, researcher positioning, and analytical assumptions.

4.7 Researcher Positionality

The researcher participated within the broader pedagogical environment connected to the pilot course and therefore adopted a reflexive stance throughout the research process. This positionality provided contextual insight into facilitation practices while also requiring continuous awareness regarding interpretation, participation, and analytical influence. Reflexivity was therefore treated as an important methodological consideration throughout data collection and analysis. Rather than treating researcher involvement solely as a limitation, the study recognises reflexive engagement as valuable for understanding communicative, relational, and collaborative dimensions of facilitation development within the educational setting.

4.8 Ethical Considerations

Participation in the study was voluntary, and participants were informed about the purpose of the research and the use of reflective materials for scholarly analysis. No sensitive personal data were collected, and all participant contributions were anonymised during analysis and reporting. The study followed ethical principles for educational research within Swedish higher education contexts, including confidentiality, informed participation, responsible handling of qualitative data, and respect for participant autonomy. Because the study involved professional educational development activities rather than sensitive personal or clinical data, formal ethical review was not required under Swedish ethical review regulations. Data consisted of reflective narratives, facilitator logs, collaborative reflections, and post-session reflections collected across multiple PBL cycles.

5. Findings

The conceptual relationships between Educational Communication (EC), facilitation competence, psychological safety, reflective practice, and collaborative inquiry are illustrated in Figure 2.

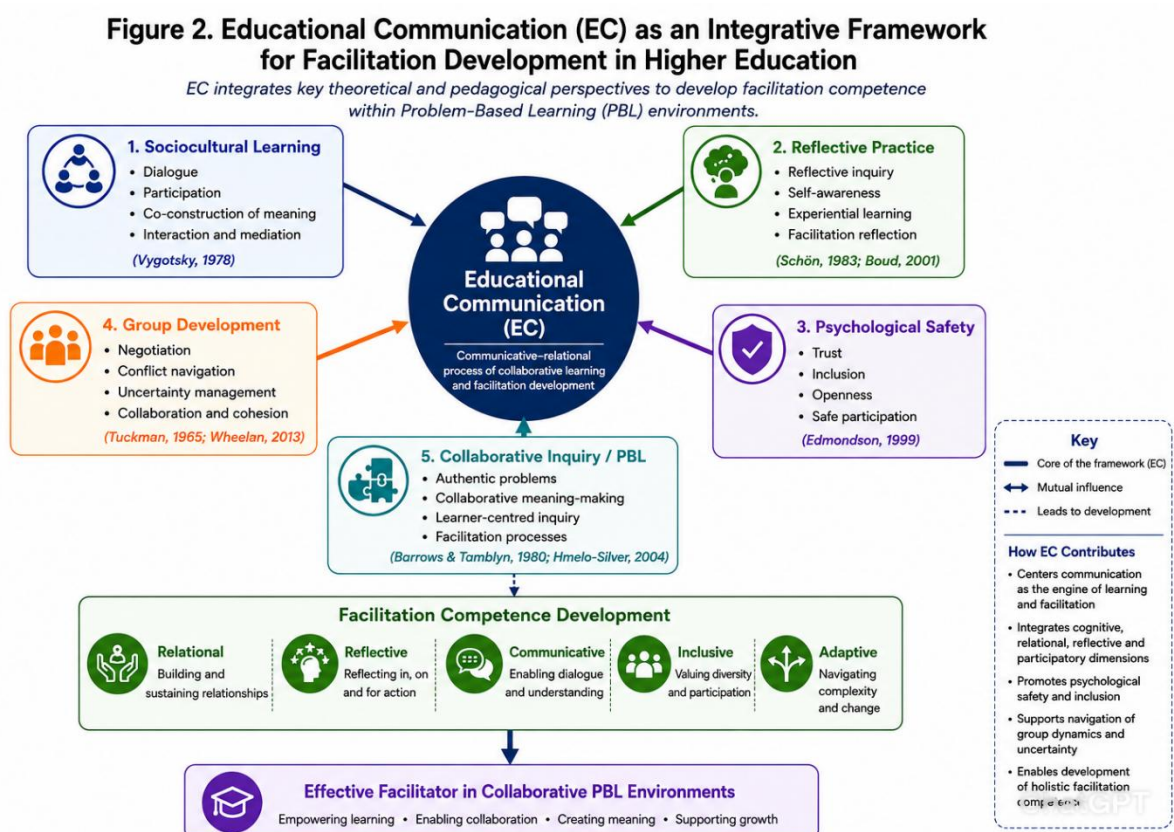


Figure 2 Educational Communication (EC) as an Integrative Framework for Facilitation Development in Higher Education

Conceptual framework illustrating how Educational Communication (EC) integrates sociocultural learning, reflective practice, psychological safety, collaborative inquiry, and group development into facilitation competence within Problem-Based Learning (PBL) environments.

The findings indicate that facilitation competence developed through iterative engagement in collaborative learning, reflective dialogue, and experiential participation within the PBL environment. Participants described facilitation learning not as the acquisition of fixed techniques but as a gradual process of becoming increasingly aware of communication, participation, group dynamics, psychological safety, and relational aspects of collaborative learning.

Five interconnected themes emerged from the analysis:

1. facilitation identity development through experiential participation,
2. communication and collaborative meaning-making,
3. navigating uncertainty, conflict, and group dynamics,
4. psychological safety and inclusive participation,
5. and reflection as pedagogical and developmental practice.

Together, these themes illustrate how facilitation competence evolved through Educational Communication (EC) within collaborative PBL processes.

5.1 Facilitation Identity Development through Experiential Participation

Participants frequently described the importance of experiencing PBL from the learner perspective before facilitating collaborative learning themselves. Alternating between learner, facilitator, observer, and reflective roles enabled participants to develop a more nuanced understanding of facilitation as a relational and communicative practice. Several participants initially associated facilitation primarily with organisation, leadership, or instructional management. However, reflective engagement within tutorial groups gradually shifted this understanding toward facilitation as support for collaborative inquiry, dialogue, participation, and group development.

One participant reflected:

“I believe it is an advantage if I, as a facilitator, have subject knowledge, although this may also reveal my inexperience and limited understanding of what facilitation actually involves.”

Another participant described facilitation less as directing learning and more as supporting collaborative process:

“A facilitator should remain neutral and avoid taking sides in discussions, instead guiding the group in working through tasks together.”

Participants increasingly described facilitators as process guides rather than content transmitters, supporters of communication and reflection, coordinators of participation, mediators of group dynamics, and contributors to psychologically safe learning environments.

Experiencing uncertainty, silence, uneven participation, and negotiation within their own groups contributed significantly to facilitation awareness. Participants recognised that collaborative learning environments require active facilitation of interaction rather than passive expectation that productive collaboration will emerge automatically.

One participant observed:

“Silence does not necessarily mean that the group is failing. Sometimes participants need time to think before responding.” This reflection illustrates increasing participant awareness of silence as a communicative and reflective component of collaborative inquiry rather than merely an indicator of disengagement.

Several participants reflected that facilitation involved “holding the process” rather than controlling discussion outcomes. This included recognising when groups required structure, when silence should be allowed space for reflection, and when intervention was necessary to support participation or clarify communication. The rotating facilitation structure enabled participants to experience facilitation from multiple perspectives and to reflect critically on how communicative practices influenced group interaction. The findings therefore suggest that facilitation competence developed experientially through participation in authentic collaborative processes rather than exclusively through theoretical instruction.

5.2 Communication and Collaborative Meaning-Making

Communication emerged as central to collaborative learning and facilitation development throughout the course. Participants repeatedly emphasised that learning occurred through

dialogue, questioning, negotiation, feedback, and shared reflection rather than through individual information acquisition alone. Educational Communication (EC) functioned as a useful analytical lens because participants described communication as shaping participation, inclusion, trust, reflection, collaborative inquiry, and group cohesion. Collaborative discussions enabled participants to negotiate meaning collectively and to examine multiple perspectives on facilitation and group work. Participants highlighted active listening, responsiveness, clarification, and reflective questioning as important facilitation practices supporting group engagement.

One participant reflected:

“We exchanged ideas about what it means to listen actively and understand other people’s reactions in communicative situations.”

Another participant emphasised the importance of communication structures that support participation:

“An open communication structure should be encouraged so that every group member’s input and feedback is heard.”

Participants also described facilitation as involving attention to interactional processes rather than solely task completion:

“The facilitator should focus on how the group works together, not only on what the group produces.”

Several participants noted that communication difficulties often became visible during collaborative activities. Uneven participation, interruptions, unclear expectations, or dominant conversational patterns occasionally constrained participation and group cohesion. However, these challenges also generated opportunities for reflection regarding facilitation strategies and communication practices. Participants further described that learning occurred not only through discussing course content but also through analysing communication itself. Reflection on interaction patterns enabled groups to recognise how conversational dynamics affected participation, inclusion, and collaborative meaning-making.

The use of structured communicative practices such as group agreements, turn-taking strategies, reflective questioning, and collaborative feedback contributed to increased participation and communicative awareness within groups. Participants also described moments where groups became “stuck” due to silence, uncertainty, or unresolved communicative tension. Rather than

viewing these moments solely as failures, participants increasingly interpreted them as important opportunities for reflection and facilitation learning.

The findings indicate that communication was not secondary to learning but constituted the mechanism through which collaborative learning, participation, facilitation development, and group cohesion occurred. Together, these findings demonstrate that communication functioned not only as a mechanism for information exchange but as the relational process through which collaborative inquiry, participation, and facilitation learning emerged.

5.3 Navigating Uncertainty, Conflict, and Group Dynamics

Participants consistently described collaborative learning as involving uncertainty, negotiation, disagreement, and evolving group dynamics. These experiences aligned closely with Tuckman's (1965) developmental stages of group formation. Many groups initially experienced uncertainty regarding expectations and roles, hesitation in participation, uneven contribution patterns, communication tensions, and differing approaches to collaboration.

Several participants described group development as more complex and time-consuming than expected.

One participant reflected:

"The course literature gave me a greater understanding of group development and of how long the process may take before a well-functioning group is established."

Participants frequently reflected on "storming" processes in which disagreement and frustration emerged during group interaction. Importantly, these tensions were not consistently interpreted negatively. Instead, participants increasingly recognised conflict and uncertainty as developmental aspects of collaborative learning.

One participant observed:

"An important lesson from students' reflective logs and self-evaluations over the years is that the so-called 'free rider' problem is less often the actual cause of group conflict than I previously assumed."

Another participant emphasised that disagreement could support learning when appropriately facilitated:

“At this stage, the facilitator should encourage students to question norms, explore new solutions, and remain open to the emergence of disagreement and friction.”

Reflective dialogue and facilitation support enabled groups to negotiate communication norms, redistribute participation, and develop greater cohesion over time.

Participants reported increased awareness of how facilitation practices could either escalate or reduce group tensions. Constructive facilitation practices included clarifying expectations, encouraging quieter participants, structuring dialogue, acknowledging uncertainty, summarising discussions, supporting reflective pauses, and facilitating respectful disagreement. Participants also highlighted that facilitation did not involve eliminating conflict entirely. Instead, facilitation involved helping groups remain communicatively engaged during periods of uncertainty and negotiation. The findings therefore support the view that conflict and uncertainty may function as productive components of collaborative inquiry when groups are supported through reflective facilitation and psychologically safe communication.

5.4 Psychological Safety and Inclusive Participation

Psychological safety emerged as a critical condition influencing participation, communication, and collaborative learning. Participants repeatedly emphasised that trust, openness, and respectful interaction significantly affected their willingness to contribute, question assumptions, and engage in reflective dialogue. Groups characterised by psychological safety demonstrated greater openness to uncertainty, increased participation, more constructive disagreement, stronger collaborative reflection, and deeper engagement in discussion. Participants highlighted the importance of facilitators in creating inclusive communicative environments where participants felt able to ask questions, express uncertainty, test incomplete ideas, disagree respectfully, and contribute without fear of embarrassment or exclusion.

One participant reflected:

“I can contribute to increased psychological safety by creating an environment where students dare to ask and answer questions, and where mistakes are viewed as an important part of the learning process.”

Another participant emphasised inclusion and mutual respect:

“It is important to create social safety so that all participants feel heard and respected.”

Participants also identified practical strategies for supporting psychological safety:

“Be personal, get to know one another, and use check-ins regularly.”

Several participants reflected that psychologically unsafe interaction patterns could quickly reduce participation and collaborative engagement. Dominating communication styles, dismissal of contributions, interruptions, or lack of responsiveness occasionally constrained group interaction. At the same time, participants observed that psychologically safe environments did not imply absence of disagreement. Instead, safety enabled groups to engage more openly with complexity, negotiation, and critical reflection.

Structured communicative practices such as group contracts, collaborative agreements, reflective turn-taking, and explicit discussion norms appeared particularly important in supporting inclusive participation. Participants also reported increased awareness of their own communicative behaviours and how this influenced group climate. The findings therefore suggest that psychological safety functions as both a communicative and pedagogical condition supporting collaborative inquiry and facilitation development within PBL environments.

5.5 Reflection as Pedagogical and Developmental Practice

Reflection constituted one of the most significant pedagogical processes within the course. Participants described reflective journaling, peer dialogue, collaborative feedback, and facilitation logs as central mechanisms supporting facilitation learning. Reflection enabled participants to critically examine communication practices, identify facilitation challenges, recognise participation patterns, analyse group dynamics, reconsider assumptions, connect theory with practice, and develop facilitation awareness.

One participant reflected:

“We can encourage individual and collective reflection so that group members become more aware of group contracts, role distribution, and communication practices that influence group dynamics.”

Another participant linked reflection directly to future facilitation practice:

“I will also help the group reflect using the Johari Window model and explore how openness, blind spots, and self-awareness can contribute to psychological safety.”

Participants frequently described becoming increasingly aware of their own communication habits, facilitation tendencies, and responses to uncertainty or conflict. Reflection therefore contributed not only to cognitive understanding but also to professional identity development.

Importantly, reflection operated simultaneously at multiple levels: individual reflection through journals, interpersonal reflection through peer dialogue, collaborative reflection through group discussion, and analytical reflection within the research process itself. Participants also reflected on the relationship between theory and lived collaborative experience. Experiencing facilitation challenges directly within groups appeared to deepen understanding of concepts such as psychological safety, group development, participation, and collaborative inquiry. Reflection further enabled participants to reinterpret difficult group experiences as meaningful learning opportunities. Moments of silence, conflict, hesitation, or communicative tension frequently became central points of professional insight when examined reflectively. The findings indicate that reflective practice strengthened facilitation competence by connecting experiential learning with communicative awareness and pedagogical interpretation. Reflection therefore functioned simultaneously as a pedagogical strategy, a professional learning mechanism, a collaborative meaning-making process, and a methodological and analytical resource within the study itself.

5.6 Synthesis of Findings: Educational Communication and Facilitation Development

Across all themes, Educational Communication (EC) functioned as an integrative analytical lens connecting participation, facilitation, communication, psychological safety, and collaborative inquiry. Facilitation competence emerged less as mastery of instructional technique and more as the ability to sustain collaborative meaning-making under conditions of uncertainty, uneven participation, and evolving group dynamics. Collaborative participation does not necessarily substitute for disciplinary knowledge acquisition; rather, it can provide a context in which disciplinary knowledge is questioned, connected, applied, and developed through interaction. The study further indicates that collaborative learning involves both cognitive and communicative processes that cannot easily be separated. Learning emerged through participation in relational and dialogical practices through which groups collectively negotiated meaning, participation, and understanding. Educational Communication therefore provides a useful conceptual framework for understanding facilitation development as a communicative, relational, and reflective process within collaborative higher education environments.

6. Discussion

The findings demonstrate that facilitation competence developed through iterative participation in collaborative, reflective, and communicative learning processes within PBL environments. Rather than emerging primarily through theoretical instruction or procedural training, facilitation competence evolved through engagement with authentic group dynamics, uncertainty, communication challenges, and reflective inquiry. The study supports sociocultural understandings of learning in which professional competence is constructed through interaction and participation (Vygotsky, 1978). Participants learned facilitation not only by discussing pedagogical concepts but by actively engaging in collaborative processes where communication, participation, reflection, and group development became shared objects of analysis. This supports previous research emphasising that collaborative learning develops through social participation and communicative interaction rather than through isolated knowledge acquisition alone.

The findings align with previous research suggesting that PBL strengthens collaborative learning, reflective practice, communication, and self-directed inquiry (Dolmans et al., 2005; Hmelo-Silver, 2004). However, this study extends existing literature by examining facilitation competence development specifically among higher education professionals and by conceptualising facilitation through the lens of Educational Communication (EC).

A central contribution of the study is the reconceptualisation of facilitation as a communicative-relational practice rather than primarily an instructional or managerial role. Participants increasingly understood facilitation not as directing discussion or transmitting knowledge but as sustaining communicative processes that support collaborative inquiry, participation, reflective dialogue, and group cohesion. This finding extends previous facilitation research by foregrounding communicative responsiveness and relational interaction as central dimensions of facilitation competence. Facilitation competence therefore appeared closely connected to attentiveness toward interactional dynamics within groups. Participants became increasingly aware of silence, participation inequalities, uncertainty, communicative tension, and evolving group relationships. Facilitation involved responding to these dynamics rather than controlling or eliminating them. Increasing awareness of communicative processes enabled participants to interpret collaborative challenges more reflectively and relationally.

The findings further demonstrate that collaborative learning environments are inherently dynamic and frequently characterised by uncertainty, disagreement, negotiation, and evolving group processes. Consistent with Tuckman's (1965) theory of group development, participants described phases of hesitation, conflict, adaptation, and increasing cohesion. Importantly, these

experiences were not interpreted solely as barriers to learning. Rather, periods of uncertainty and communicative tension frequently became conditions through which deeper reflection and collaborative negotiation emerged.

The concept of “stuck phases” was particularly significant in this regard. Groups occasionally experienced silence, uneven participation, or communicative disruption that temporarily interrupted collaborative progress. However, reflective examination of these situations frequently generated deeper awareness of facilitation practices and group processes. These findings suggest that communicative disruption may function as an important pedagogical moment within collaborative inquiry when groups are supported through reflective facilitation.

Psychological safety emerged as another central condition shaping participation and collaborative learning. Consistent with Edmondson and Lei (2014), participants were more willing to contribute openly when group interaction was characterised by trust, responsiveness, inclusion, and respect. The findings further indicate that psychological safety was communicatively constructed through interactional practices such as active listening, equitable participation structures, collaborative feedback, reflective questioning, and explicit communication norms. This finding extends existing psychological safety research by illustrating how safety emerges relationally through Educational Communication within collaborative learning environments. Psychological safety therefore appeared not merely as an interpersonal condition but as an ongoing communicative accomplishment shaped through participation and interaction.

Reflection also played a central role in facilitation development. Reflective journals, peer discussions, facilitation logs, and collaborative dialogue enabled participants to critically analyse communication patterns, facilitation decisions, and group dynamics while connecting theoretical concepts with lived experience. Reflection emerged as embedded within collaborative interaction itself, particularly during dialogue, disagreement, hesitation, and feedback processes. The findings therefore support understandings of reflection not solely as an individual cognitive activity but as a collaborative and communicative process occurring through interaction and shared meaning-making. Reflection functioned simultaneously as pedagogy, inquiry, professional learning, and analytical practice.

The study further contributes to facilitation research through the conceptual development of Educational Communication (EC) as an analytical framework for understanding collaborative higher education learning environments. EC positions communication not merely as a tool

supporting learning but as the mechanism through which participation, facilitation, reflection, and collaborative meaning-making are co-constructed.

Unlike prior studies that primarily conceptualise facilitation as instructional guidance or scaffolding, this study extends the literature by framing facilitation as Educational Communication (EC), emphasising relational meaning-making, communicative responsiveness, and interactional uncertainty. This perspective helps bridge sociocultural learning theory, facilitation research, psychological safety, and collaborative pedagogy by foregrounding how communicative interaction shapes both learning processes and facilitation development.

A central conceptual contribution of the study is therefore the positioning of Educational Communication as a communicative-relational analytical framework for understanding facilitation competence in collaborative higher education. Educational Communication foregrounds communication not as secondary to learning but as the process through which participation, reflection, facilitation, and collaborative inquiry are collectively constructed within PBL environments. The findings additionally suggest that collaborative learning may be understood not only as learning in groups but as learning as groups, where participation, reflection, communication, and meaning-making emerge collectively through relational interaction. This distinction highlights the importance of examining group processes not merely as contextual conditions but as active sites of collaborative cognition and pedagogical development. Together, these findings indicate that facilitation competence develops relationally through participation in communicative, reflective, and collaborative processes rather than through mastery of instructional procedures alone.

From a practical perspective, the study indicates that facilitation competence development may be strengthened through professional learning environments that integrate experiential collaboration, rotating facilitation roles, reflective dialogue, and explicit attention to communication, psychological safety, and group dynamics. The pilot course therefore demonstrates potential as a transferable Continuing Professional Development (CPD) model for facilitation development within higher education contexts. The findings further suggest that facilitation training should extend beyond instructional methods to include communicative, relational, reflective, and psychological dimensions of collaborative learning. Such an approach may become increasingly important as higher education institutions continue expanding collaborative, interdisciplinary, and student-centred pedagogies.

Higher education institutions implementing collaborative pedagogies should therefore recognise facilitation competence as a distinct professional capability requiring structured professional development rather than assuming facilitation skills emerge automatically through teaching experience alone. Overall, the study demonstrates that facilitation competence is best understood as a dynamic communicative practice shaped through participation, reflection, uncertainty, and collaborative inquiry. Educational Communication (EC) provides a conceptual framework for understanding how facilitation development emerges relationally through interaction within collaborative higher education environments.

6.1 Conceptual Contribution

A central conceptual contribution of this study is the development of Educational Communication (EC) as a communicative-relational analytical framework for understanding facilitation competence in collaborative higher education. EC positions communication not merely as support for learning but as the mechanism through which participation, reflection, facilitation, and collaborative meaning-making are co-constructed within PBL environments.

6.2 The Epistemic Dimension of Facilitation Competence

The findings also invite a broader conceptualisation of facilitation competence in relation to the knowledge that emerges through collaborative inquiry. The present analysis demonstrates how participants developed awareness of communication, participation, psychological safety, uncertainty, and collaborative meaning-making; however, the social realist critique of PBL highlights an additional epistemic question that is not sufficiently captured by a primarily relational and communicative account of facilitation. Wheelahan (2010) argues that educational processes must provide learners with meaningful access to theoretical knowledge, while Bernstein's (2000) distinction between horizontal and vertical discourse draws attention to the different explanatory capacities of experiential and systematic disciplinary knowledge. From this perspective, facilitation cannot be concerned only with enabling learners to contribute what they already know. It must also involve recognising when collaborative discussion remains at the level of context-dependent or experiential understanding and supporting movement toward disciplinary concepts and explanations.

This perspective extends, rather than replaces, the Educational Communication framework proposed in this study. EC can be understood not only as enabling participation, dialogue, reflection, and relational meaning-making, but also as creating communicative conditions in which disciplinary knowledge can be questioned, clarified, connected, and progressively

developed. Facilitation competence may therefore be conceptualised as having both a relational-communicative and an epistemic responsibility. The present study provides empirical evidence for the former dimensions, while the latter represents an important theoretical extension that should be examined directly in future empirical research.

7. Implications for Higher Education Practice

The findings of this study have several implications for higher education pedagogy, facilitation training, collaborative learning design, and Continuing Professional Development (CPD). First, the study highlights the importance of explicitly developing facilitation competence within higher education rather than assuming that collaborative learning skills emerge automatically through teaching experience. Many educators work within collaborative or student-centred pedagogical environments without formal preparation in facilitation, group dynamics, psychological safety, or reflective communication practices. The findings suggest that facilitation competence should be recognised as a distinct pedagogical capability involving:

- communicative awareness,
- relational responsiveness,
- reflective practice,
- management of group dynamics,
- and support for collaborative inquiry.

Second, the study indicates that facilitation learning is strengthened through experiential participation in collaborative educational processes. Educators benefited from simultaneously experiencing and facilitating collaborative learning environments, enabling them to reflect critically on participation, communication, and group interaction from multiple perspectives. Professional development initiatives may therefore benefit from incorporating:

- rotating facilitation roles,
- collaborative inquiry activities,
- reflective journals,
- peer dialogue,

- facilitation observation,
- and structured feedback processes.

These practices may strengthen reflective awareness and communicative responsiveness within collaborative educational settings.

Third, the findings emphasise the importance of psychological safety within collaborative higher education environments. Inclusive participation, reflective inquiry, and constructive disagreement appeared more likely when groups established communicative conditions characterised by trust, openness, and respectful interaction.

Higher education facilitators may therefore benefit from intentionally implementing practices such as:

- group agreements,
- reflective questioning,
- equitable participation structures,
- collaborative norms,
- and active listening strategies.

These practices may help groups navigate uncertainty, disagreement, and communicative tension more constructively while supporting inclusive participation and collaborative inquiry.

Fourth, the study highlights the pedagogical value of reflection as both a learning process and a facilitation strategy. Reflective activities enabled participants to connect theory with experience, examine interaction patterns, and develop awareness of facilitation practices.

Reflective learning structures may therefore support deeper pedagogical engagement within collaborative higher education settings while strengthening professional learning and communicative awareness.

Fifth, the study suggests that Educational Communication (EC) may function as a useful conceptual framework for understanding collaborative learning processes in higher education. EC foregrounds communication as central to participation, facilitation, reflection, and collaborative meaning-making.

This perspective may help educators move beyond content-centred understandings of teaching toward more relational and communicative approaches to collaborative pedagogy. Educational Communication may also contribute to interdisciplinary dialogue across higher education pedagogy, collaborative learning research, communication studies, and professional development scholarship.

Finally, the pilot course demonstrates potential for broader implementation as a transferable CPD model across higher education institutions. The collaborative and reflective facilitation model may support interdisciplinary professional learning and strengthen institutional capacity for collaborative pedagogy, facilitation training, and student-centred educational development.

Institutional support for facilitation-focused professional development may therefore strengthen collaborative learning quality, psychological safety, interdisciplinary cooperation, and reflective educational practice across higher education environments.

The model may also contribute to ongoing international discussions regarding sustainable, inclusive, and participatory higher education practices aligned with collaborative learning and lifelong professional development initiatives.

8. Limitations and Future Research

Several limitations should be considered when interpreting the findings of this study. First, the study was conducted within a specific pilot professional development course involving participants from Swedish higher education institutions. The findings are therefore contextually situated and may not be directly generalisable to all higher education environments or facilitation training contexts. The Swedish higher education context may also shape collaborative norms, communication practices, and facilitation approaches differently from other institutional or cultural environments. Additionally, because the researcher participated within the broader pedagogical environment, participant reflections and collaborative interactions may have been influenced by relational familiarity and contextual awareness, despite ongoing reflexive attention throughout the research process.

Second, the study employed a qualitative design-based case study approach focused on reflective and experiential participant perspectives. While this approach enabled rich insight into collaborative learning and facilitation development processes, the findings are interpretive rather than statistically generalisable. The study also relied substantially on reflective and

interaction-based qualitative data. Although such data provided valuable insight into facilitation learning processes, reflective accounts may be influenced by participant interpretation, self-awareness, group dynamics, and contextual relationships within the course. The findings therefore represent interpreted experiences rather than direct measurement of facilitation effectiveness.

Third, the participant group consisted primarily of higher education professionals already interested in collaborative learning, facilitation, or pedagogical development. Participants may therefore have been particularly motivated toward reflective engagement and collaborative participation. This may have influenced the nature of the participant reflections and collaborative interactions observed within the course.

Fourth, the study focused primarily on participant experiences and communicative processes within the course environment and did not systematically examine the long-term transfer of facilitation competence into participants' subsequent teaching practices or institutional contexts. Consequently, the study provides insight into facilitation competence development within the course environment but cannot determine the extent to which this development was sustained or translated into subsequent teaching practice.

A further limitation concerns the epistemic dimension of learning. The study analysed participants' experiences of facilitation, communication, reflection, psychological safety, and collaborative processes, but it did not systematically assess the disciplinary knowledge developed through the PBL activities. Consequently, the study cannot determine whether facilitation practices resulted in stronger conceptual understanding, reduced misconceptions, or movement from experiential knowledge toward more systematic disciplinary knowledge. The epistemic dimension introduced in the revised conceptualisation should therefore be understood as a theoretically derived extension rather than as an empirically validated outcome of the present study. Despite these limitations, the study provides important insight into facilitation competence development within collaborative higher education environments and contributes conceptually through the development of Educational Communication (EC) as an analytical framework.

Several directions for future research emerge from these limitations and findings. Future studies could examine the long-term impact of facilitation-focused CPD programmes on teaching practice and investigate facilitation development across different disciplinary or cultural contexts. Comparative studies involving multiple institutions or international collaborative

learning contexts may further strengthen understanding of how facilitation competence develops across differing educational cultures and pedagogical traditions. Future research could also explore facilitation learning within fully online or hybrid collaborative environments, examine relationships between psychological safety and collaborative learning outcomes, and investigate communication structures supporting equitable participation.

Future research may further examine how collaborative learning groups navigate “stuck phases,” uncertainty, and conflict across varying educational settings and levels of facilitation support. Such research could contribute to understanding collaborative learning not only as learning in groups but also as learning as groups, where collective participation, communication, and meaning-making become central dimensions of pedagogical inquiry.

The epistemic dimension of facilitation competence also requires further empirical investigation. Future research should examine how facilitators recognise, evaluate, and respond to learners’ experiential knowledge, misconceptions, and emerging disciplinary understanding. Studies could analyse facilitator interventions that connect learner contributions to disciplinary concepts and examine whether such interventions support movement from context-dependent knowledge toward more systematic explanatory understanding. This would provide empirical evidence for the epistemic dimension of Educational Communication proposed conceptually in the present study and could further develop the framework theoretically and empirically.

Further theoretical development of Educational Communication may contribute to interdisciplinary dialogue across higher education pedagogy, communication studies, collaborative learning research, and professional development scholarship. Together, these directions may strengthen understanding of facilitation competence as a developing practice situated within communication, collaborative learning, reflection, psychological safety, and the movement between experiential and disciplinary knowledge.

9. Conclusion

This study explored how educators developed facilitation competence through participation in a reflective Problem-Based Learning (PBL)-based professional development course implemented across a consortium of Swedish higher education institutions. The findings indicate that facilitation competence develops through iterative engagement in collaborative learning, reflection, communication, and experiential participation rather than through the

acquisition of discrete instructional techniques alone. Participants' facilitation learning was closely connected to their encounters with group dynamics, uncertainty, uneven participation, psychological safety, disagreement, and the need to negotiate meaning collaboratively. Through repeated cycles of participation and reflection, participants developed greater awareness of how their communicative choices shaped group interaction and how facilitation could support dialogue, inclusion, participation, reflective inquiry, and collaborative learning.

The findings further suggest that facilitation in PBL environments is inherently relational and developmental. Collaborative learning does not proceed as a linear or predictable process; rather, it involves ongoing negotiation among participants, evolving group relationships, uncertainty, and competing perspectives. These conditions should therefore not necessarily be treated as disruptions to effective learning. When supported through appropriate facilitative communication, uncertainty and interactional tension can become productive conditions for reflection, learning, and the development of facilitation competence. Psychological safety was particularly important in this regard. The findings indicate that psychological safety is not simply a pre-existing characteristic of a learning group but is continuously constructed and maintained through communicative practices involving trust, inclusion, responsiveness, recognition of participants' contributions, and opportunities for equitable participation. Facilitation consequently involves creating interactional conditions in which participants can question, disagree, reflect, and contribute without undermining their sense of belonging or participation.

A central conceptual contribution of the study is the development of Educational Communication (EC) as a communicative-relational analytical lens for understanding facilitation and collaborative learning in higher education. EC positions communication not as a supplementary process through which pedagogical activities are delivered, but as constitutive of learning, participation, facilitation, reflection, and collaborative meaning-making. From this perspective, facilitation competence develops through communicative participation in practice: educators learn to facilitate by engaging with others, interpreting group processes, responding to emerging situations, reflecting on their interventions, and adapting their practice. EC therefore provides an integrative conceptual perspective that connects sociocultural learning, collaborative pedagogy, psychological safety, reflective practice, and facilitation development.

The study also contributes to the reconceptualisation of facilitation as a communicative-relational practice rather than primarily an instructional or managerial function. Effective facilitation does not depend on controlling the direction of group interaction or ensuring that

predefined procedures are followed. Instead, it involves continuously interpreting and responding to the relational, communicative, and pedagogical conditions of collaborative inquiry. The facilitator must attend simultaneously to participation, group development, dialogue, reflection, and the conditions that enable learners to engage productively with one another. The reflective PBL course examined in this study provides evidence that such competence can be cultivated through structured opportunities to participate, practise facilitation, receive feedback, observe group processes, and critically reflect on experience. The resulting model therefore offers a potentially transferable approach to professional learning for educators working with collaborative and student-centred pedagogies, while recognising that its applicability requires further investigation across different institutional, disciplinary, and educational contexts.

At the same time, the findings indicate that facilitation competence should not be understood solely in relational, communicative, or reflective terms. An important implication of the study is the need to recognise an epistemic dimension of facilitation. Collaborative and student-centred learning can create valuable opportunities for learners to draw on experience, generate interpretations, and construct meaning collectively; however, such processes do not automatically ensure engagement with systematic disciplinary knowledge. Facilitation therefore also entails an epistemic responsibility: facilitators need to recognise what kinds of knowledge are being produced or mobilised in group inquiry and, where necessary, help participants connect experiential and contextual contributions to disciplinary concepts, explanations, evidence, and ways of knowing. This does not imply returning to facilitator-centred transmission or diminishing learner agency. Rather, it suggests that learner-centred facilitation requires a deliberate balance between supporting participation and ensuring meaningful engagement with disciplinary knowledge.

This epistemic dimension extends the Educational Communication framework by drawing attention to the relationship between communicative-relational processes and knowledge development. Facilitation can thus be understood as involving at least two interdependent responsibilities: creating communicative and relational conditions that enable meaningful participation, and supporting the development and refinement of knowledge within collaborative inquiry. The facilitator's role is consequently neither to control learning nor to withdraw from it, but to mediate the conditions under which learners can participate, question, reflect, and progressively engage with disciplinary knowledge. Taken together, the findings support an iterative understanding of facilitation development in which participation generates

experience, experience becomes an object of reflection, reflection informs subsequent communication and action, and renewed participation provides further opportunities for learning and development. This process highlights facilitation competence as situated, emergent, and continuously developed through practice. The study therefore contributes to higher education research by bringing together reflective professional learning, collaborative PBL, Educational Communication, psychological safety, and epistemic responsibility within a single conceptual account of facilitation development.

The study is based on a qualitative design-based case within a specific professional development context and therefore does not claim statistical generalisability. Its contribution lies instead in the conceptual and practice-oriented insights that can inform further research and professional learning across comparable higher education settings.

Future research should examine how the proposed reflective model operates across different disciplines, institutional contexts, cultures, and forms of PBL, and should investigate more directly how facilitators negotiate the relationship between learner agency, relational participation, psychological safety, and disciplinary knowledge. In particular, the epistemic dimension of facilitation warrants further empirical attention, including research into how facilitators recognise knowledge gaps, introduce disciplinary concepts without undermining collaborative inquiry, and balance student participation with responsibility for knowledge development. Overall, this study demonstrates that facilitation competence in higher education is developed through communicative participation, reflective inquiry, experiential engagement, and sustained attention to both relational and epistemic dimensions of collaborative learning. By conceptualising Educational Communication as a communicative-relational and epistemically attentive framework, the study offers a basis for understanding facilitation not as the management of learning from outside the group, but as a situated practice through which educators and learners collectively create the conditions for meaningful participation, reflection, inquiry, and knowledge development.

Statements/Declarations:

Ethics approval and consent to participate: Not applicable.

Competing interests: The authors declare that they have no competing interests.

Funding: Not applicable.

Data availability statement: Although the manuscript and supporting materials sufficiently present the findings of this study, the author may make the underlying data publicly available upon reasonable request if required.

Author's contributions: The author conceived the study, conducted the analysis, and prepared the manuscript. It is him alone that conducts this study and provides intellectual input. The author has read and approved the content. **ORCID:** <https://orcid.org/0000-0003-2157-6538>

Acknowledgements:

The author would like to express sincere gratitude to Elisabeth Persson (Swedish University of Agricultural Sciences, SLU) for the invitation to participate in the pilot course. Special thanks are also extended to Eva Hammar Chiriac (Linköping University, LiU), Lars Uhlin (Linköping University, LiU, Karolinska Institutet, KI, and Mälardalen University, MDU, and Per Sanden (Linköping University, LiU) for their valuable support, insights, and encouragement throughout the programme. This submission represents the author's own work. The author also wishes to thank delegates and colleagues within the group discussion who shared their reflections.

References

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Bernstein, B. (2000). Pedagogy, symbolic control, and identity: Theory, research, critique. Rowman & Littlefield. <https://doi.org/10.5040/9798216401735>

Wheelahan, L. (2010). Why knowledge matters in curriculum: A social realist argument. Routledge. <https://doi.org/10.4324/9780203860236> DOI 10.4324/9780203860236

Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education*. Springer.

https://catalog.nlm.nih.gov/discovery/fulldisplay/alma995246913406676/01NLM_INST:01NLM_INST

- Barrows, H. S. (1996). Problem-based learning in medicine and beyond: A brief overview. *New Directions for Teaching and Learning*, 1996(68), 3–12. <https://doi.org/10.1002/tl.37219966804>
- Dolmans, D. H. J. M., De Grave, W., Wolfhagen, I. H. A. P., & Van Der Vleuten, C. P. M. (2005). Problem-based learning: Future challenges for educational practice and research. *Medical Education*, 39(7), 732–741. <https://doi.org/10.1111/j.1365-2929.2005.02205.x>
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235–266. <https://doi.org/10.1023/B:EDPR.0000034022.16470.f3>
- Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher*, 38(5), 365–379. <https://doi.org/10.3102/0013189X09339057>
- Barkley, E. F., Cross, K. P., & Major, C. H. (2005). *Collaborative learning techniques: A handbook for college faculty*. Jossey-Bass.
- Cohen, E. G., & Lotan, R. A. (2014). *Designing group work: Strategies for the heterogeneous classroom* (3rd ed.). Teachers College Press.
- Kovari, A. (2025). A systematic review of AI-powered collaborative learning in higher education: Trends and outcomes from the last decade. *Social Sciences & Humanities Open*, 11, 101335. <https://doi.org/10.1016/j.ssaho.2025.101335>
- Lotan, R. A. (2014). Crafting group-worthy learning tasks. In E. G. Cohen & R. A. Lotan (Eds.), *Designing group work: Strategies for the heterogeneous classroom* (3rd ed., pp. 85–97). Teachers College Press.
- Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin*, 63(6), 384–399. <https://doi.org/10.1037/h0022100>
- Edmondson, A. C., & Lei, Z. (2014). Psychological safety: The history, renaissance, and future of an interpersonal construct. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 23–43. <https://doi.org/10.1146/annurev-orgpsych-031413-091305>
- Poort, I., Jansen, E., & Hofman, A. (2020). Does the group matter? Effects of trust, cultural diversity, and group formation on engagement in group work in higher education. *Higher*

Education Research & Development, 39(3), 511–526.
<https://doi.org/10.1080/07294360.2020.1839024>

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)

D'Eon, M., & Zhao, R. (2022). Five ways for facilitators to get a grip on small group learning. *Canadian Medical Education Journal*, 13(2), 82–88. <https://doi.org/10.36834/cmej.72949>

Ruben, B. D., & Gigliotti, R. A. (2016). Leadership as social influence: An expanded view of leadership communication theory and practice. *Journal of Leadership & Organizational Studies*, 23(4), 467–479. <https://doi.org/10.1177/1548051816641876>

Stenbom, S. (2018). A systematic review of the Community of Inquiry survey. *The Internet and Higher Education*, 39, 22–32. <https://doi.org/10.1016/j.iheduc.2018.06.001>

Deci, E. L., & Ryan, R. M. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage Publications.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>

SUPPORTING MATERIAL

Supporting Information for: Developing Facilitation Competence through Reflective Problem-Based Learning: A Qualitative Design-Based Case Study in Higher Education

Isak Rajjak Shaikh^{1,2,3*}

¹ Swedish University of Agricultural Sciences (SLU), P.O. Box 7070, Uppsala, SE-750 07, Sweden (Facilitation of Groups in Higher Education – the pilot course coordinated by the Didacticum vid Linköpings, Linköping Universitet, Linköping, SE-581 83, in a consortium

setting with SLU, Karolinska Institutet, Liu, Mälardalens Universitet, and Blekinge Tekniska Högskola, Sweden), Linköping Universitet, Linköping, SE-581 83 Sweden.

² Razaaq University Consortium, Paulsgatan 8 D, 214 46 Malmö, Sweden

³ Razak Institution of Skills, Education & Research (RISER), Nanded – 431 605, India

* Correspondence via <isak.rajjak@gmail.com> <isak@razaaq.se>

S1. Highlights

- Examines a PBL-based facilitator training model across Swedish higher education
- Reconceptualises group work challenges as learning opportunities through Educational Communication
- Demonstrates the role of reflection as both pedagogy and research data
- Shows how psychological safety supports facilitation competence and collaborative learning
- Proposes a theoretically grounded and scalable model for facilitator development

S2. Contribution of the Study

This study makes three interrelated contributions to research on higher education pedagogy, collaborative learning, and facilitator development:

- (i). This study reconceptualises group work in Problem-Based Learning (PBL) not merely as a pedagogical setting for individual learning, but as a dynamic and relational process through which groups themselves evolve as learning entities. In doing so, it advances the understanding of collaborative learning as occurring both in groups and as groups, highlighting the developmental and communicative nature of collective knowledge construction (Vygotsky, 1978; Garrison et al., 2000).
- (ii). The study introduces Educational Communication (EC) as an integrative analytical construct that unifies cognitive, social, affective, and structural dimensions of learning in collaborative environments. EC complements existing frameworks such as sociocultural learning theory and the Community of Inquiry by explicitly incorporating the communicative

processes through which learning is co-constructed, while also foregrounding the role of inclusion, diversity, and widening participation as constitutive conditions of learning rather than external contextual factors (Fraser, 2008; hooks, 1994; OECD, 2017). In this sense, EC provides a theoretically grounded lens for understanding how meaning-making, participation, and power relations intersect in group-based learning processes.

(iii). The study contributes empirically by examining how facilitation competence develops through experiential engagement in a PBL-based professional development course for higher education educators. By focusing on educators as learners, the study demonstrates how reflective practice, lived group experience, and engagement with real-time group dynamics foster the development of facilitation capacity, particularly in relation to managing group processes, supporting psychological safety, and navigating conflict (Edmondson & Lei, 2014).

The findings therefore inform both theory and practice by identifying facilitation as a multidimensional, communicative, and developmental competence that is essential for the effective implementation of collaborative and inclusive pedagogies in higher education. Overall, the study offers a theoretically informed model with potential applicability across higher education contexts for facilitator development that bridges the gap between pedagogical theory and practice, while positioning Educational Communication as a central analytical construct for understanding learning, interaction, inclusion, and participation in contemporary higher education.

EC is proposed as an integrative analytical construct that complements existing frameworks such as sociocultural learning theory and the Community of Inquiry by explicitly incorporating the communicative mechanisms through which learning is co-implementation of collaborative and inclusive pedagogies in higher education. Overall, the study offers a theoretically informed model with potential applicability across higher education contexts for facilitator development that bridges the gap between pedagogical theory and practice, while positioning Educational Communication as a central analytical mechanism for understanding learning, interaction, and inclusion in contemporary higher education.

S3. More about the Pilot Course Context

The pilot course *Facilitation of Groups in Higher Education* was implemented as a collaborative Continuing Professional Development (CPD) initiative involving multiple

Swedish higher education institutions. The course combined synchronous webinars, asynchronous collaborative activities, reflective journaling, rotating facilitation roles, peer feedback processes, and tutorial-group-based Problem-Based Learning (PBL). Participants engaged both as learners and facilitators throughout iterative collaborative learning cycles designed to strengthen facilitation competence, reflective practice, communication awareness, and group process management.

S4. Educational Communication (EC) as an Integrative Analytical Lens

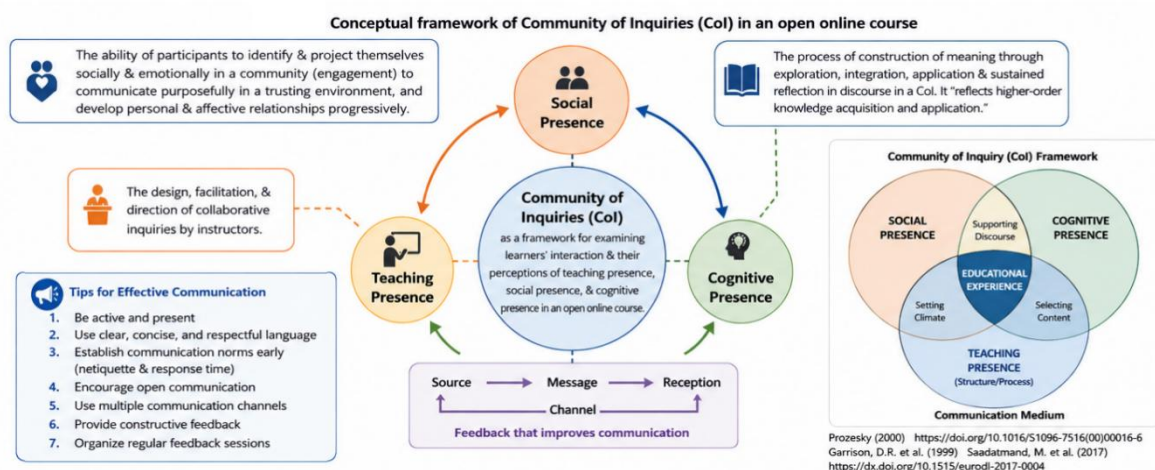
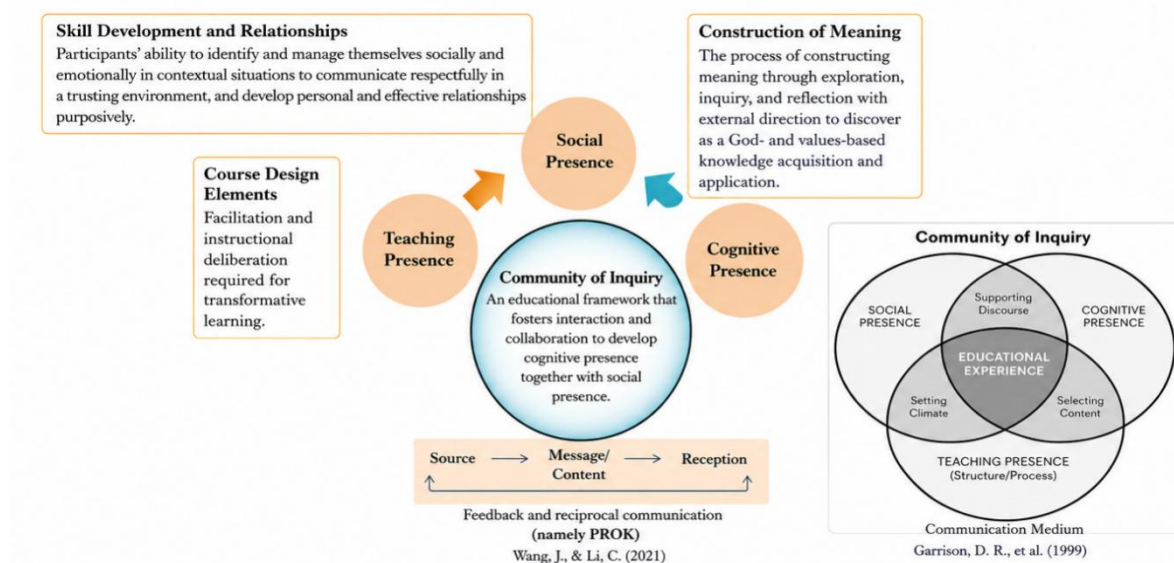
Educational Communication (EC) is conceptualised in this study as the communicative and relational process through which participation, collaborative inquiry, reflective dialogue, facilitation development, and meaning-making are co-constructed within higher education learning environments. EC extends existing collaborative learning perspectives by positioning communication not merely as supportive of learning but as constitutive of how collaborative participation, psychological safety, facilitation competence, and reflective engagement emerge within Problem-Based Learning (PBL) contexts.

Educational Communication also includes an epistemic dimension. Communication within collaborative inquiry does not only support participation and relational meaning-making; it provides a mechanism through which learners' experiential contributions can be connected with disciplinary concepts, explanatory frameworks, and more systematic forms of knowledge. This dimension responds to social realist concerns that student-centred collaborative learning may become knowledge poor when access to disciplinary knowledge is insufficiently supported (Bernstein, 2000; Wheelahan, 2010).

The interactional relationships between teaching presence, social presence, cognitive presence, and Educational Communication (EC) are illustrated in Figure S3.

S5. Supplementary Figures

A supplementary conceptual representation of Educational Communication (EC) and facilitation competence development is presented in the Graphical Abstract Figure.



Graphical Abstract Figure. Conceptual framework of educational communication and facilitation competence development within reflective problem-based learning (PBL).

The figure illustrates how educational communication (EC) is shaped through the dynamic interaction of Problem-Based Learning (PBL), facilitation competence, psychological safety, reflective practice, and collaborative meaning-making. The framework highlights the iterative relationships among communication, participation, inquiry, and reflection in fostering transformative learning experiences. The integrated Community of Inquiry (CoI) model further demonstrates the interconnected roles of teaching presence, social presence, and cognitive presence in supporting meaningful educational experiences.

The interrelationships among communication, reflection, participation, psychological safety, and facilitation competence are conceptually illustrated in Figure S1.

The cyclical nature of facilitation learning through reflection, participation, dialogue, feedback, and experiential engagement is illustrated in Figure S2.

Figure S1. Educational Communication (EC) and Collaborative Facilitation Development

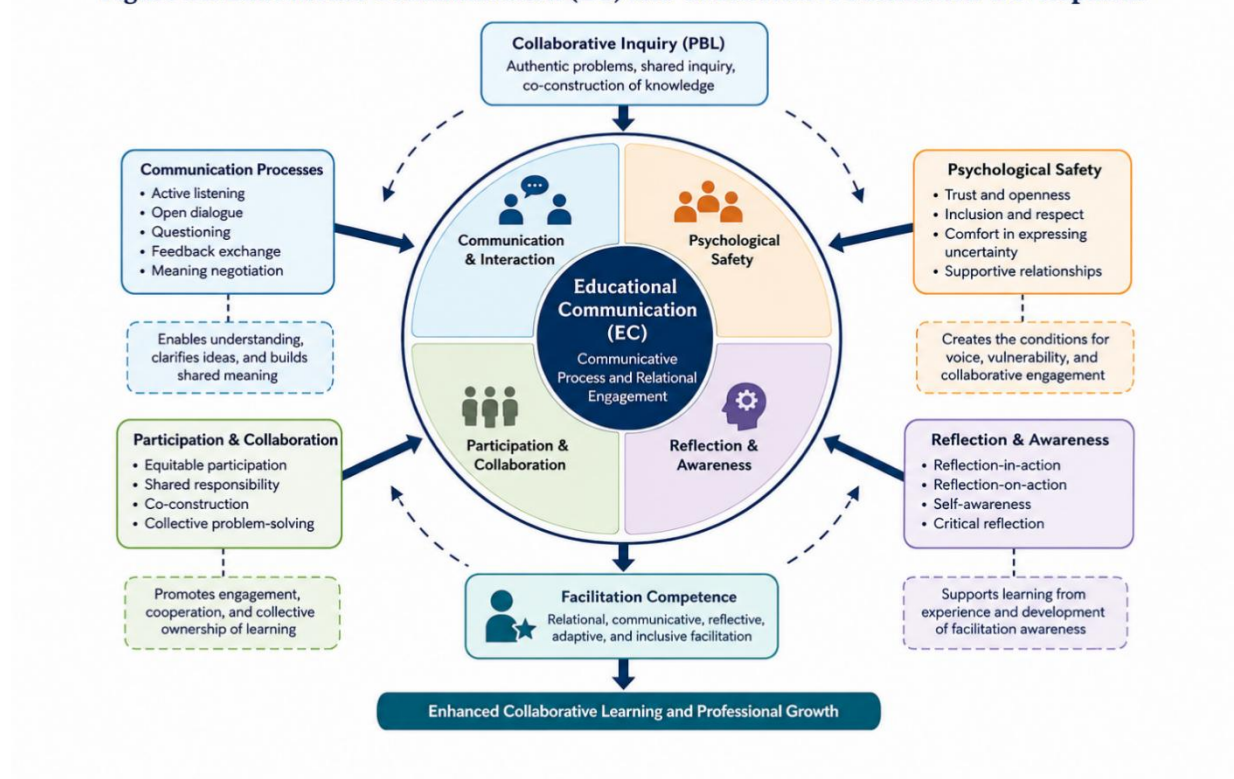


Figure S1. Educational Communication (EC) and Collaborative Facilitation Development. Conceptual illustration showing relationships between communication, reflection, psychological safety, participation, collaborative inquiry, and facilitation competence within reflective PBL environments.

Figure S2. Iterative Reflective Facilitation Cycle
Developing Facilitation Competence in Reflective PBL Environments



Figure S2. Iterative Reflective Facilitation Cycle.
Cyclical representation of facilitation learning through participation, reflection, collaborative dialogue, feedback, and experiential engagement.

Figure S3. Communication Processes within Collaborative Inquiry
Interactional Relationships among Teaching Presence, Social Presence, Cognitive Presence, and Educational Communication (EC)

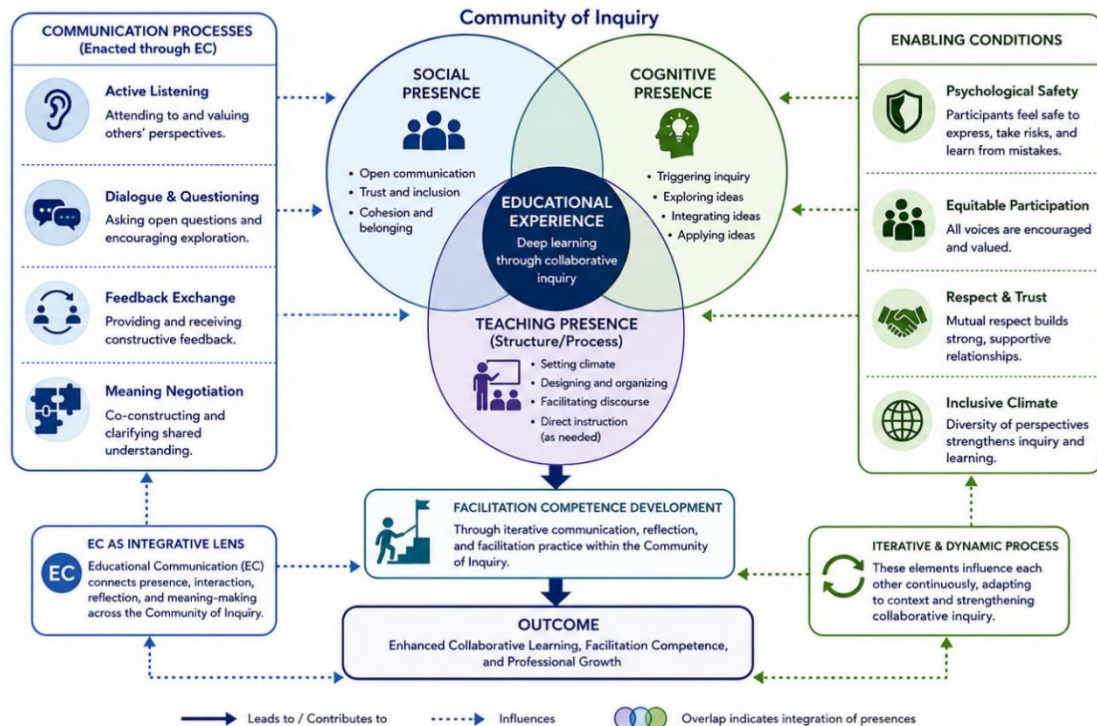


Figure S3. Communication Processes within Collaborative Inquiry.
Illustration of interactional relationships between teaching presence, social presence, cognitive presence, and Educational Communication (EC).

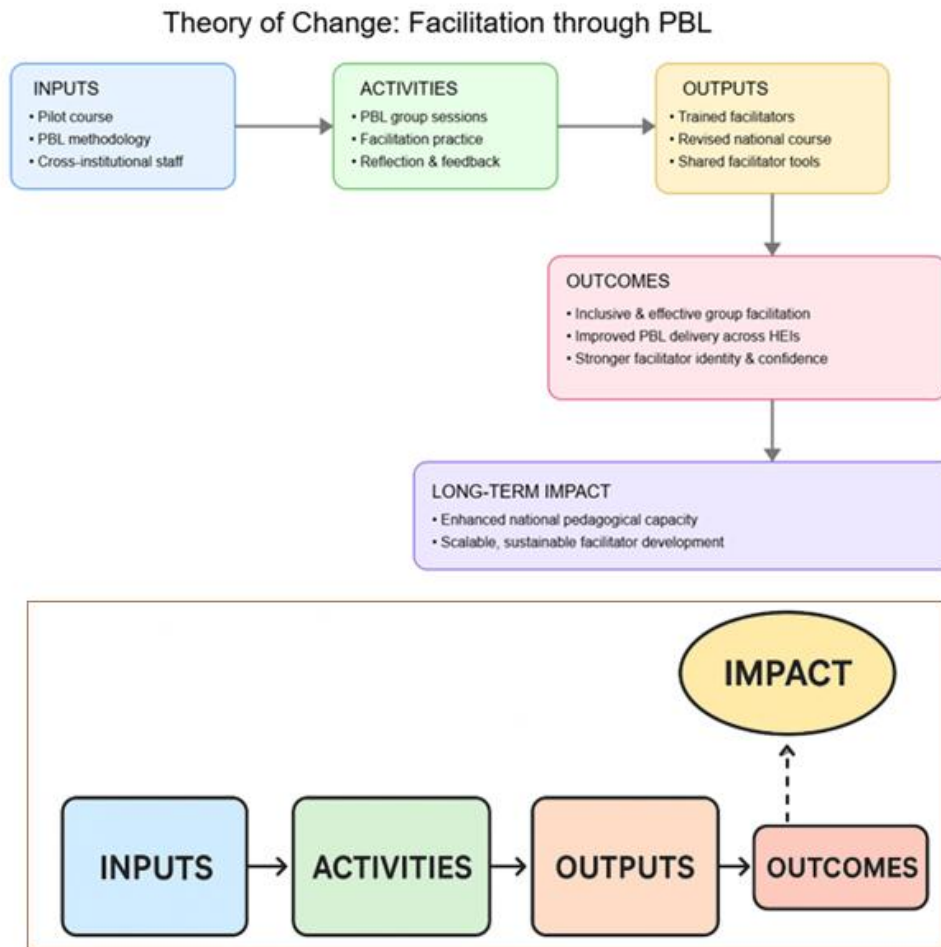


Figure S4. Theory of Change

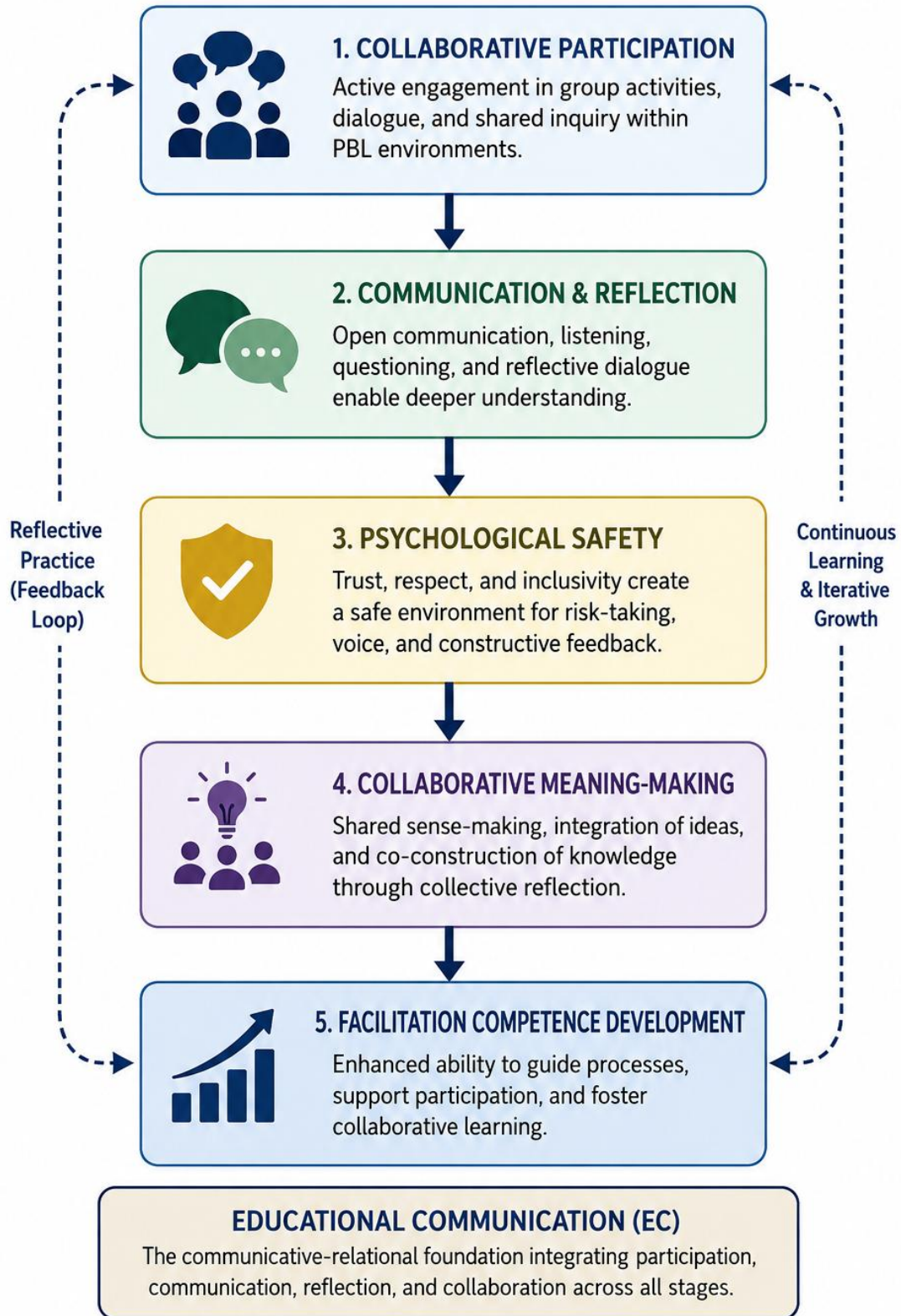
Community of Inquiry brings about the change.

The pilot course is underpinned by a Theory of Change that conceptualises how facilitation competence in collaborative higher education develops through iterative cycles of participation, reflection, and communicative engagement. The model proposes that when learners and facilitators engage in structured collaborative inquiry within psychologically safe environments, supported by Educational Communication (EC), they progressively develop deeper awareness of group dynamics, reflective capacity, and adaptive facilitation strategies. These processes are expected to strengthen both individual and collective agency in learning situations, enabling participants to move from task-oriented participation towards more dialogic, inquiry-driven forms of collaboration. The Theory of Change further suggests that sustained exposure to reflective practice, feedback loops, and guided interaction leads to observable improvements in facilitation competence, including the ability to manage conflict, foster inclusion, and support shared meaning-making. Over time, these developmental

processes are expected to contribute to more effective collaborative learning environments and enhanced pedagogical quality within problem-based learning contexts.

Figure S5 Educational Communication as a Facilitation Development Process

Educational Communication as a Facilitation Development Process



S6. Supplementary Tables

A summary of the major analytical themes and representative reflective evidence is presented in Table S1, while examples of facilitation strategies supporting collaborative learning and communicative participation are summarised in Table S2. Examples of reflective prompts used to support facilitation awareness and collaborative inquiry are presented in Table S3, and examples of structured interaction practices supporting inclusion, communication, and psychological safety are presented in Table S4. The primary analytical coding categories applied during thematic analysis are summarised in Table S5, and indicators supporting the pilot course Theory of Change framework are summarised in Table S6. Table S7 gives overview of analytical procedure (cf. methodology).

Table S1. Summary of Themes and Representative Evidence

Theme	Representative Focus in Participant Reflections
Facilitation identity development	Participants questioning facilitator role, neutrality, leadership, and process support
Communication as collaborative meaning-making	Active listening, open interaction, group dialogue, communication structures
Psychological safety	Vulnerability, inclusion, trust, “high ceiling,” mistakes as learning
Uncertainty, conflict, and group dynamics	Disagreement, group development, conflict handling, uncertainty in collaboration
Reflection as professional learning	Reflective logs, metaperspectives, self-awareness, theory–practice integration

Table S2. Facilitation Strategies Supporting Collaborative Learning in PBL Environments

Facilitation Strategy	Purpose	Contribution to Collaborative Learning
Reflective questioning	Encourages critical reflection and dialogue	Supports collaborative inquiry and meaning-making
Structured turn-taking	Promotes equitable participation	Reduces dominance and increases inclusion
Group agreements/contracts	Establishes communication norms	Strengthens psychological safety
Rotating facilitation roles	Develops facilitation awareness	Encourages shared responsibility
Peer feedback activities	Supports reflective learning	Enhances communicative awareness
Active listening practices	Improves responsiveness and inclusion	Strengthens relational engagement
Reflective journaling	Connects experience with theory	Supports facilitation identity development
Epistemic questioning and knowledge checking	Identifies conceptual gaps, misconceptions, assumptions, experiential and connections to disciplinary knowledge	Supports movement from contributions toward systematic disciplinary understanding

Table S3. Example Reflective Questions Used in Facilitation Journals

Reflective Focus	Example Prompt
Communication	How did communication patterns influence participation in the group?
Facilitation	What facilitation strategies supported or constrained collaboration?
Psychological safety	When did participants appear comfortable expressing uncertainty?

Reflective Focus	Example Prompt
Group dynamics	How did the group respond to disagreement or silence?
Reflection	What did I learn about my own facilitation approach?

Table S4. Examples of Structured Interaction Practices

Practice	Purpose
Group agreements	Establish collaborative norms and expectations
Rotating facilitator roles	Encourage experiential facilitation learning
Reflective turn-taking	Support equitable participation
Peer feedback sessions	Strengthen collaborative reflection
Check-ins and check-outs	Promote relational awareness and psychological safety

Table S5. Analytical Coding Categories

Analytical Category	Focus of Analysis
Facilitation identity	Development of facilitator awareness and role understanding
Communication patterns	Dialogue, listening, participation, interaction
Collaborative meaning-making	Shared inquiry and negotiation of understanding
Psychological safety	Trust, openness, inclusion, vulnerability
Reflection	Reflexive learning and theory–practice integration
Group development	Conflict, uncertainty, cohesion, negotiation

Epistemic facilitation — Conceptual extension concerning how facilitators attend to knowledge quality, disciplinary concepts, misconceptions, and progression beyond experiential understanding; proposed for future empirical investigation.

Table S6. Theory of Change Indicators

Level	Indicator	Data Source
Inputs	Staff participation rate	Registration logs
Activities	Number of PBL sessions	Course schedule
Outputs	Facilitators certified	Course completion
Outcomes	Improved facilitation competence	Self/peer assessment
Impact	Pedagogical innovation across HEIs	Follow-up surveys

Table S7. Overview of Analytical Procedure

Phase Analytical Activity

Phase 1 Familiarisation with reflective journals and collaborative documentation

Phase 2 Initial coding of facilitation, communication, and reflective processes

Phase 3 Development of preliminary themes

Phase 4 Iterative thematic refinement

Phase 5 Theoretical interpretation through Educational Communication (EC)

S7. Example Reflective Prompts and Facilitation Activities

Participants engaged in recurring reflective and collaborative activities throughout the course. These activities included facilitation observations, reflective journaling, collaborative feedback discussions, rotating facilitation exercises, and structured dialogue activities intended to support awareness of communication, participation, group dynamics, and facilitation processes.

Example reflective prompts included:

- How did the group negotiate participation and communication?
- What communicative practices contributed to psychological safety?

- How did facilitation influence collaborative inquiry?
- What challenges emerged during moments of uncertainty or disagreement?
- How did reflection influence facilitation awareness?

S8. Additional Thematic Evidence

The qualitative dataset contained extensive reflective material related to facilitation identity, communication practices, psychological safety, collaborative inquiry, uncertainty management, and reflective professional learning. Themes frequently overlapped because participants described facilitation development as relational, communicative, and iterative rather than linear or technique-based.

Representative thematic areas included:

- negotiation of facilitator neutrality,
- communication and participation structures,
- reflective engagement with group conflict,
- development of communicative awareness,
- experiences of collaborative uncertainty,
- and evolving understanding of facilitation as relational practice.

S9. Reflexive and Methodological Notes

The study adopted a reflexive qualitative approach recognising that facilitation learning, collaborative inquiry, and reflective interpretation were relationally situated within the educational environment itself. Reflection therefore functioned simultaneously as pedagogical process, participant learning mechanism, and analytical resource. The researcher maintained ongoing reflexive awareness regarding interpretation, participation, and analytical positioning throughout the research process.

S10. Purpose of the Pilot Course and Impact Thereof

S10.1 Objectives

The pilot course was designed to explore:

1. How educators experience learning through PBL when positioned as learners.
2. How these experiences shape their understanding of facilitation practice.
3. What competencies facilitators need to support effective group learning.
4. How a facilitator training programme can be structured to be inclusive, scalable, and aligned with national pedagogical standards.
5. What revisions and improvements are needed to form a full, nationally offered course.

The broader pedagogical logic and intended developmental outcomes of the pilot course are summarised in the Theory of Change model presented in Figure S4.

S10.2 Impact at Multiple Levels

Individual Level

- Enhanced facilitation competence
- Stronger reflective and communication skills
- Greater confidence in PBL and collaborative learning models

Institutional Level

- Increased pedagogical capacity
- Better alignment between educational practice and institutional strategies
- Formation of a facilitator community of practice

National Level

- Scalable model for facilitator preparation
- Strengthened national collaboration in higher education pedagogy
- A harmonised approach to group facilitation training across institutions

Thus, the pilot course at Linköping University served as an essential foundation for the development of a robust, evidence-based national course on group facilitation through PBL. The experiences of participants offered meaningful insights into how educators learn to

facilitate, what competencies they require, and how training environments can be optimally designed. The new course reflects a pedagogically refined, strategically aligned, and sustainably structured facilitator training programme that advances UNESCO's goals for quality, equity, and learner-centred higher education.¹

¹ See United Nations Educational, Scientific and Cultural Organisation (UNESCO), *Beyond Limits: New Ways to Reinvent Higher Education* (Paris: UNESCO, 2022), which emphasizes quality, equity, inclusion, and learner-centred approaches as core goals of higher education reform.

References (for Supporting Information):

Bernstein, B. (2000). *Pedagogy, symbolic control, and identity: Theory, research, critique*. Rowman & Littlefield. <https://doi.org/10.5040/9798216401735>

Wheelahan, L. (2010). *Why knowledge matters in curriculum: A social realist argument*. Routledge. <https://doi.org/10.4324/9780203860236> DOI 10.4324/9780203860236

Fraser, N. (2008). *Scales of justice: Reimagining political space in a globalizing world*. Columbia University Press.

Hooks, B. (1994). *Teaching to transgress: Education as the practice of freedom*. Routledge.

OECD. (2017). *Education at a glance 2017: OECD indicators*. OECD Publishing. <https://doi.org/10.1787/eag-2017-en>

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [GA.png](#)
- [SUPPORTINGMATERIAL.docx](#)