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METHODOLOGY FOR DEVELOPING PRACTICAL COMPETENCE OF PRE-SERVICE SPECIAL EDUCATORS THROUGH CORRECTIVE-DEVELOPMENTAL CASES AND PROFESSIONAL SIMULATIONS

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Abstract
The preparation of special educators requires more than knowledge of diagnostic categories and corrective techniques. Graduates must be able to interpret incomplete evidence, recognise learner strengths and environmental barriers, design an inclusive response, communicate with learners, families and interdisciplinary professionals, use assistive and digital tools, and revise decisions after feedback. This article develops a methodology for forming practical competence through corrective-developmental cases and professional simulations. The study is theoretical and design-oriented; it combines analysis of inclusive education frameworks, competence mapping, synthesis of case-based and simulation-based learning research, and pedagogical modelling. Six competence components are operationalised: diagnostic-analytical, corrective-design, procedural-practical, communicative-collaborative, digital-assistive, and reflective-ethical. The proposed methodology follows eight connected stages: competence mapping, case briefing, diagnostic reasoning, decision design, simulated performance, structured debriefing, redesign and reperformance, and transfer assessment. A taxonomy of cases and simulation formats is presented, together with pedagogical conditions, evidence sources and four developmental levels. The central design principle is that a realistic scenario alone does not

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guarantee learning. Effective practice requires graduated scaffolding, explicit learner voice, individual accountability, structured debriefing, repeated performance, accessibility and human oversight of consequential decisions. Assessment triangulates case rationale, performance observation, communication evidence, accessible products, reflection, revision history and a new transfer case rather than equating clicks or completion with competence. The methodology provides a traceable foundation for future expert validation, pilot implementation and quasi-experimental testing without claiming completed empirical effects.

Keywords: Practical competence; pre-service special educators; case-based learning; professional simulation; inclusive education; structured debriefing; authentic assessment; reflective practice.

Introduction

Professional work in special education is characterised by uncertainty, interaction and ethical responsibility. A special educator rarely receives a complete, unambiguous data set followed by one correct method. Instead, the educator must interpret observations, learner products, family perspectives, institutional conditions and specialist reports; distinguish a temporary difficulty from a stable pattern; identify barriers to participation; and select a response that is educationally useful, accessible and respectful. National legislation and international disability-rights frameworks place dignity, non-discrimination, participation, accessibility and inclusive education at the centre of such decisions [1–9]. These requirements make practical competence an integrated capacity rather than a collection of isolated procedures.

In university programmes, however, professional preparation may remain separated into lectures on theory, seminars on terminology and occasional practice placements. Students can reproduce classifications or describe a corrective method, yet experience difficulty when a case contains conflicting evidence, when a learner reacts unexpectedly, or when family and professional perspectives differ. Real placements are indispensable, but they cannot provide every student with the same range of complex situations. They also involve

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ethical and safety limits: inexperienced students should not practise high-stakes decisions on real learners without systematic preparation and supervision.

Corrective-developmental cases and professional simulations offer an approximation of practice. A case represents a professionally meaningful situation through documents, observations, learner voice, contextual information and a decision problem. A simulation adds time, roles, interaction, branching consequences or tool use, requiring students to perform rather than merely discuss a solution. Such environments can make reasoning visible, pause and repeat critical moments, expose assumptions, and provide feedback before students work independently in real settings. Evidence from higher education indicates that simulation can support complex skills when it includes appropriate scaffolding and reflection [18–25].

Yet realism alone is insufficient. A detailed scenario may overwhelm novices, encourage guessing, or reward theatrical confidence rather than sound judgment. A role play may reproduce stereotypes if learner voice is absent. Digital simulation may collect excessive data or present inaccessible interfaces. Debriefing may become an instructor monologue or a search for the single expected answer. Therefore, cases and simulations must be embedded in a didactic methodology that connects competence outcomes, scenario features, support, observation, feedback, reperformance and transfer.

Practical competence is particularly demanding in special education because technical accuracy and ethical legitimacy cannot be separated. A student may choose a plausible intervention but use stigmatising language, ignore consent, exclude the learner from the decision, or recommend a segregating solution where an environmental adaptation is possible. Conversely, a respectful attitude without diagnostic reasoning and procedural skill does not ensure educational effectiveness. The learning design must therefore mobilise knowledge, values, communication, action and reflection in the same situation.

The purpose of this article is to develop a methodology for forming the practical competence of pre-service special educators through corrective-developmental cases and professional simulations. The study addresses four questions: (1) which components constitute practical competence in an inclusive professional context; (2) which case and simulation types are needed to represent its complexity; (3)

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how should an instructional cycle combine scaffolding, performance, debriefing and repeated practice; and (4) which evidence can support a defensible interpretation of competence? The article is a theoretical and design-oriented contribution and does not report fabricated participant scores or completed intervention effects.

Literature Review

Practical competence in inclusive special-educator preparation

Competence-oriented education defines outcomes as the mobilisation of knowledge, skills, values and judgment in context. Constructive alignment requires learning activities and assessment to demand the same form of performance as the intended outcome [13, 14]. Shulman's concept of pedagogical content knowledge is relevant because a special educator must transform disciplinary and diagnostic knowledge into decisions appropriate for a particular learner, goal and environment [13]. Inclusive pedagogy further shifts attention from categorising learners to extending meaningful participation and examining how ordinary provision can be made accessible [10–12].
The Profile of Inclusive Teachers identifies valuing learner diversity, supporting all learners, working with others and continuing professional development as core values and areas of competence [6]. These dimensions imply that practical competence includes not only individual instruction but also collaboration, consultation, environmental adaptation and reflection. A professional response is adequate when it is technically reasoned, rights-based, understandable to stakeholders, feasible in context and open to correction.

Case-based learning and situated professional reasoning

Situated learning argues that professional knowledge develops through participation in meaningful practices rather than through decontextualised information alone [15]. Experiential learning and reflective practice likewise connect concrete experience, interpretation, conceptualisation, action and reconsideration [16, 17]. Case-based learning operationalises these ideas by placing learners in a bounded situation that requires evidence selection, hypothesis formation and decision justification. Reviews across professional

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education report that well-designed cases can support engagement, knowledge integration, critical thinking and collaborative reasoning, although outcomes depend on facilitation and assessment [18].

A useful case is not simply a story followed by comprehension questions. It contains a professional problem, sufficient but incomplete evidence, relevant constraints, multiple perspectives and consequences. Its design should prevent the diagnostic label from functioning as the answer. In special education, the case should include learner strengths and preferences, environmental conditions, accessibility, family or teacher perspectives, and an ethical tension. Students should be required to explain what is known, what remains uncertain, what additional evidence is needed, and how the proposed action supports participation.

Simulation, scaffolding, debriefing, and transfer

Simulation-based learning enables students to practise complex skills in a safe, repeatable environment. A meta-analysis of 145 higher-education studies found a large positive overall effect and showed that scaffolding and technology can add value, with different supports benefiting learners at different levels of prior knowledge [19]. Research in simulation-rich professional fields highlights deliberate practice, feedback, varied difficulty and opportunities for repetition as important design features [20–22, 31]. Although much of this evidence comes from health professions, the underlying skills – diagnosis, communication, collaboration and decision making – are also central to teacher and special-educator preparation.

Debriefing is the bridge between experience and learning. It should help students reconstruct what happened, reveal the assumptions behind action, compare effects with intended goals, and identify a specific next performance [20, 21]. A purely judgment-free discussion may conceal standards, while a punitive correction suppresses inquiry. Debriefing with good judgment makes criteria explicit and invites the learner to examine the frames that produced an action [21]. The cycle becomes educationally stronger when students redesign the response and perform again with reduced support rather than ending with verbal reflection.

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Formative feedback is effective when it is timely, specific, usable and linked to a next action [23–26]. In simulation, automated or peer feedback can identify missing steps, communication patterns or accessibility metadata, but contextual and ethical judgment requires teacher oversight. Transfer must also be tested. Repeating the identical scenario may show memory for the script; a new case with changed learner characteristics, resources or stakeholder interests is needed to demonstrate flexible competence.

Evidence, validity, and ethical safeguards

Assessment of practical competence is an interpretive argument. A score is meaningful only when tasks represent the intended construct, observations are sufficiently reliable, and the proposed use is appropriate [27, 28]. No single evidence source captures the whole construct. Written case rationale can show reasoning but not interactive performance; observation can show action but may miss internal assumptions; self-reflection can reveal learning but may be strategically written. Triangulation across rationale, observed behaviour, product quality, stakeholder communication, reflection, revision and transfer strengthens interpretation.

Ethical safeguards are part of instructional quality. Scenarios should avoid sensationalising disability, revealing real personal data or reproducing harmful stereotypes. Digital tools should meet accessibility requirements, collect only necessary data and provide alternative participation routes [4–9]. Learners must know whether video, analytics or artificial intelligence is used, who can access records, and how automated suggestions can be challenged. High-stakes judgments remain the responsibility of qualified educators.

Methodology and Research Design

Research design. The study is theoretical and design-oriented. Its output is a pedagogical methodology and an associated evidence architecture for future implementation. No participant data, effect sizes or experimental outcomes are invented. The methodology was developed through conceptual analysis, competence mapping, synthesis of primary rights and inclusion frameworks, and

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design principles derived from case-based, simulation-based, formative assessment and reflective-practice research [4–32].

Analytical procedure. The design process consisted of seven stages. First, professional functions of special educators were mapped: assessment, corrective-developmental planning, instruction, consultation, collaboration, accessibility, monitoring and reflection. Second, observable actions were extracted and consolidated into competence components. Third, case variables were identified, including learner characteristics, strengths, participation barriers, evidence quality, stakeholders, resources, time and ethical constraints. Fourth, simulation phases were aligned with component indicators. Fifth, scaffolds and feedback routes were assigned to likely novice difficulties. Sixth, evidence sources and critical indicators were specified. Seventh, a traceability review checked whether every intended component had an activity, observation point, feedback opportunity, reperformance and transfer task.

Design criteria. The methodology was considered conceptually adequate when it met nine criteria: professional authenticity; inclusive and rights-based orientation; explicit learner voice; graduated scaffolding; accessibility; individual accountability within collaboration; structured debriefing; multi-evidence assessment; and human oversight. A future validation programme should include expert review, participatory feedback from persons with disabilities and families, accessibility testing, pilot scenario analysis, inter-rater reliability, learner workload evaluation, and a quasi-experimental comparison with a non-simulation but content-equivalent course [27–29].

Research Results

Result 1: an operational structure of practical competence

The first design result is a six-component construct. The components are analytically distinguishable for diagnosis and feedback, but they operate together in a professional situation. Diagnostic-analytical competence interprets evidence; corrective-design competence converts interpretation into an inclusive plan; procedural-practical competence implements the plan; communicative-

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collaborative competence coordinates people and perspectives; digital-assistive competence selects accessible tools; and reflective-ethical competence evaluates consequences and revises action.

Table 1 Operational structure of practical competence for pre-service special educators

Component	Core content	Observable indicators	Recommended evidence
Diagnostic-analytical	Evidence collection, comparison, hypothesis, learner strengths, needs and barriers.	Distinguishes observation from inference; identifies missing evidence; constructs a contextual needs profile.	Case evidence map; situational judgement; diagnostic rationale.
Corrective-design	Goals, adaptations, corrective-developmental methods, resources and exit criteria.	Writes observable goals; compares alternatives; justifies support without lowering common outcomes.	Individual plan; lesson adaptation; risk and accessibility review.
Procedural-practical	Implementation, pacing, prompting, observation and real-time adjustment.	Performs a planned sequence; responds to learner cues; changes support while preserving safety and purpose.	Simulation checklist; video observation; practical product.
Communicative-collaborative	Learner voice, family partnership, interdisciplinary dialogue and shared decisions.	Uses respectful language; elicits perspective; explains evidence; negotiates roles; documents individual contribution.	Consultation simulation; meeting record; peer/stakeholder feedback.
Digital-assistive	Accessible resources, assistive tools, privacy, data and technology-supported participation.	Selects a tool for a pedagogical function; checks accessibility; protects data; provides an alternative route.	Accessible artefact; tool rationale; WCAG/UDL checklist.
Reflective-ethical	Consequences, assumptions, feedback use, correction, transfer and responsibility.	Identifies a strong and weak decision point; revises action; explains ethical trade-offs; transfers learning.	Debriefing record; revision history; e-portfolio; new-case performance.

Result 2: a taxonomy of corrective-developmental cases and simulations

The second result is a scenario taxonomy. Variation is necessary because competence cannot be inferred from one familiar case. Scenarios differ by professional function, interaction intensity, uncertainty and fidelity. Low-fidelity cases may use documents and written decisions; medium-fidelity simulations include role-based consultation or video branching; high-fidelity approximations combine live interaction, time pressure, assistive tools and changing consequences. Fidelity is selected for the learning goal rather than maximised for its own sake.

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Each scenario has a common architecture: context and role; learner strengths and voice; evidence package; participation barrier; professional problem; available resources; stakeholder perspectives; ethical or safety constraint; expected product; and criteria. A case should contain enough information for a reasoned first action but preserve uncertainty that requires additional questions. The diagnostic label is deliberately insufficient as a solution.

Table 2 Typology of cases and simulation formats

Scenario type	Core features	Expected performance	Typical risk exposed
Diagnostic reasoning case	Conflicting observations, learner work, interview excerpts and contextual data.	Evidence map, provisional hypothesis, additional assessment plan.	Premature closure; label-based inference; confirmation bias.
Instructional adaptation case	A common learning goal with sensory, communication, cognitive or behavioural access barriers.	Accessible lesson adaptation and support-fading plan.	Lowered expectations; inaccessible materials; excessive prompting.
Corrective-developmental session	Observable skill target, learner response cues and limited session time.	Performance sequence, data record, in-action adjustment.	Rigid script; weak cue reading; unsafe or intrusive support.
Family consultation	Different expectations, emotionally sensitive information and shared decision needs.	Plain-language explanation, question protocol, agreed next step.	Deficit language; one-way advice; confidentiality breach.
Interdisciplinary meeting	Multiple specialists, incomplete evidence and role overlap.	Shared goal, responsibility matrix, conflict rationale.	Professional dominance; fragmented plans; undocumented decisions.
Assistive/digital tool scenario	Tool options, accessibility constraints, privacy and maintenance requirements.	Tool selection, user trial, alternative route and data safeguards.	Technology-first choice; inaccessible interface; unnecessary data collection.
Ethical dilemma and safety case	Competing rights, consent, urgency, reputational or physical risk.	Risk-benefit analysis, escalation route, defensible decision.	Rule memorisation without context; minimising learner voice; automation bias.
Transfer case	Changed age, setting, resources or stakeholder interests.	Adapted plan and justification without copying the prior script.	Surface transfer; overgeneralisation; failure to update evidence.

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Result 3: an eight-stage case-and-simulation methodology

The third result is an eight-stage cycle shown in Figure 1. It begins with an explicit competence map and ends with transfer assessment that recalibrates the next target. Teacher orchestration and simulation or digital tools support the cycle but do not replace professional judgment. The sequence is intentionally recursive: evidence from debriefing and transfer updates the learner profile and the amount of scaffolding.

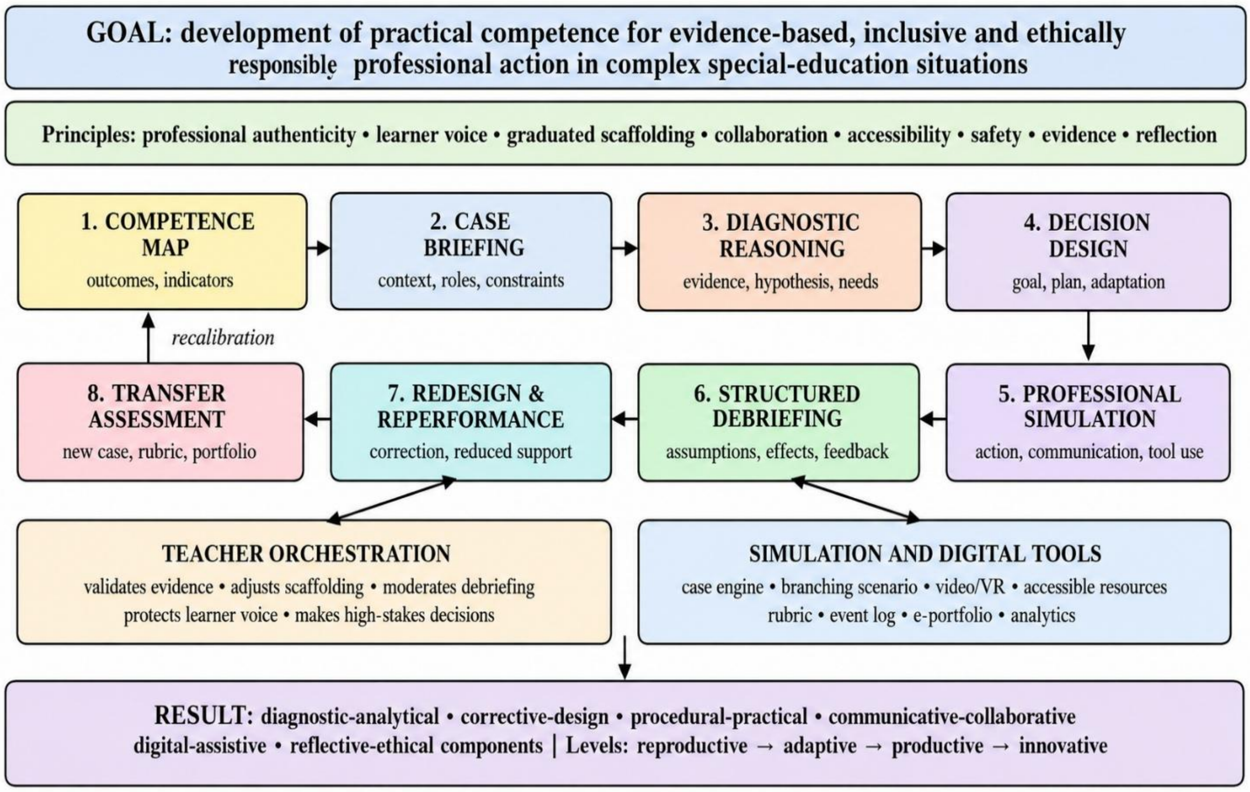

Figure 1. Case-and-simulation cycle for developing practical competence

Stage 1 – competence mapping. The educator selects a limited set of indicators and makes success criteria visible before the activity. Students analyse examples and non-examples of evidence. Critical indicators related to dignity, safety, privacy and truthful representation are identified as minimum thresholds rather than optional rubric points.

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Stage 2 – case briefing. Students receive the context, role, purpose and available evidence. Briefing distinguishes learning fiction from real personal data, establishes psychological safety and explains how participation will be recorded. The instructor does not reveal the preferred solution but clarifies constraints and professional responsibilities.

Stage 3 – diagnostic reasoning. Students classify evidence by source and reliability, identify strengths and barriers, formulate provisional hypotheses, and list information still needed. A reasoning template can support novices; advanced students use a less structured evidence map. The output is a transparent argument, not a hidden intuitive label.

Stage 4 – decision design. Students set an observable goal, compare at least two options, choose adaptations or corrective-developmental methods, anticipate consequences, and specify an exit criterion. Learner voice and family or stakeholder perspectives must be represented. The plan includes an accessible alternative and a response to foreseeable risk.

Stage 5 – professional simulation. Students perform the consultation, session, meeting, lesson segment or technology trial. Observers collect criterion-referenced evidence rather than general impressions. Branching events reveal how the student responds to uncertainty: the learner may refuse a task, a family member may challenge terminology, or a digital tool may fail.

Stage 6 – structured debriefing. Participants reconstruct events, compare intention with effect, examine assumptions, and receive multi-source feedback. A useful sequence is description, analysis, principle connection, alternative action and next-performance commitment. The instructor states professional standards while inviting the student to explain the frame behind the action [20, 21].

Stage 7 – redesign and reperformance. Students revise the plan and perform the critical segment again. Support is reduced when prior knowledge and performance increase. Reperformance distinguishes productive learning from verbal agreement with feedback and creates direct evidence that the learner can act differently.

Stage 8 – transfer assessment. A new case changes key variables while preserving the competence demand. Students complete a rationale, performance or product

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and add evidence to an electronic portfolio. Results recalibrate the competence profile and determine the next case complexity or support level.

Result 4: pedagogical conditions and an evidence-based assessment architecture

Seven interdependent conditions were derived. They make the difference between an engaging activity and a competence-development methodology. Conditions are expressed through observable implementation and evidence so that the design can be reviewed before an empirical study.

Table 3 Pedagogical conditions for implementing the methodology

Pedagogical condition	Operational mechanism	Evidence of implementation
1. Authentic and bounded professional problem	Scenario requires a consequential decision, but role, time, data and safety boundaries are clear.	Case specification; professional-function map; pilot review.
2. Learner voice and strengths in the evidence package	The person is represented as an agent with preferences and capabilities, not only as a diagnosis.	Voice statement; strength profile; user or advocate review.
3. Graduated scaffolding without lowered outcomes	Examples, prompts, role cards and pauses vary by prior knowledge while common critical outcomes remain.	Scaffold record; explanation of recommendation; support-fading plan.
4. Structured collaboration and individual accountability	Roles require listening and negotiation; individual reasoning and contribution are separately documented.	Contribution log; peer evidence; shared decision and individual rationale.
5. Debriefing linked to reperformance	Feedback identifies evidence, assumption, effect, next action and exit criterion; the critical segment is repeated.	Debriefing protocol; revised plan; second-performance observation.
6. Multi-evidence authentic assessment	Rationale, observed action, product, communication, reflection, revision and transfer are triangulated.	Analytic rubric; portfolio; transfer case; inter-rater record.
7. Accessibility, privacy and human oversight	Resources and interfaces are accessible; data are minimised; automated support is explainable and non-final.	Accessibility audit; consent/data notice; teacher override; alternative route.

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Assessment uses an analytic rubric with component-level descriptors. At the reproductive level, the student follows a model in a familiar case and needs substantial prompting. At the adaptive level, the student selects and adjusts a known method when one or two contextual variables change. At the productive level, the student independently integrates evidence, action, collaboration and reflection in a complex case and demonstrates transfer. At the innovative level, the student develops and tests a new accessible solution, explains its limits and ethical risks, and uses stakeholder evidence to improve it.

The methodology avoids simple averaging across all indicators. A high-quality presentation cannot compensate for a privacy breach, harmful language or unsafe procedure. Critical indicators have minimum thresholds. Non-critical weaknesses generate a corrective route rather than a permanent label. Profiles are time-bound and component-specific: a student may be productive in diagnostic reasoning and adaptive in family consultation.

Digital traces are interpreted cautiously. Time-on-task, number of attempts, clicks or scenario completion may identify a need for investigation but do not directly prove professional competence. A defensible judgment uses performance evidence and selected process traces to explain how the student reached a decision. Automated feedback may flag omitted steps or inaccessible metadata, while teachers retain responsibility for contextual, ethical and high-stakes interpretations.

The proposed methodology can be implemented incrementally. A university may begin with one diagnostic case, one consultation simulation and one transfer task. The design team defines four or five indicators, prepares an accessible evidence package, trains observers, pilots the debriefing protocol and examines workload. Only after evidence and scoring procedures are stable should the programme add branching digital scenarios, video analytics or immersive technology.

Discussion

The methodology responds to a central problem in professional preparation: the gap between knowing about special education and acting responsibly in a complex situation. Cases connect theoretical categories with evidence and judgment; simulations connect judgment with interaction and procedural action;

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debriefing connects action with underlying assumptions; reperformance connects feedback with change; transfer connects local success with broader competence. This full chain is more demanding than a lecture followed by a written test, but it represents the construct more faithfully.

The approach is consistent with situated, experiential and reflective theories of professional learning [15–17]. It also aligns with research showing that simulation is particularly effective for complex skills when instructional support is differentiated and reflection is built into the design [19]. The methodology extends these principles to special education by making learner voice, accessibility and ethical safeguards part of scenario quality rather than supplementary discussion topics.

A key contribution is the distinction between scenario fidelity and professional authenticity. High visual or technological realism is not always necessary. A document-based case can be professionally authentic if it requires real forms of evidence interpretation and justification. Conversely, an immersive simulation may be educationally weak if it rewards speed, excludes users with disabilities or lacks a structured debriefing. The appropriate fidelity is the minimum needed to elicit the target action safely and reliably.

Another contribution is the integration of collaboration with individual accountability. Special educators work in teams, but group products can hide unequal participation and weak personal reasoning. Role rotation, individual rationale, contribution logs and targeted observer evidence allow students to practise shared decision making while preserving a valid basis for individual feedback.

The methodology also constrains the use of artificial intelligence and analytics. Generative tools may help produce scenario variants, accessible drafts or feedback prompts, but they can also invent facts, amplify stereotypes and encourage automation bias. Any AI-supported content requires expert review, disclosure and a path for challenge. No automated recommendation should determine a learner label, placement or high-stakes competence judgment.

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Practical Implications

Programme teams should first develop a competence and evidence map. Each course module selects a small number of indicators and identifies where students will reason, perform, receive feedback, repeat and transfer. Cases can then be distributed across semesters with increasing uncertainty, interaction and independence. Early cases emphasise evidence selection and worked examples; later simulations reduce scaffolding, add stakeholders and require ethical trade-offs.

Teacher educators need preparation in scenario writing, inclusive facilitation, observation, structured debriefing, rubric use, accessibility and data ethics. A moderation meeting using sample performances can improve consistency before scoring student work. Students also need orientation: a simulation is not theatre, disclosure of uncertainty is not failure, and respectful challenge is part of professional learning.

A digital environment may include a case library, branching scenario engine, role-based discussion, accessible media, observation forms, rubric scoring, electronic portfolios and component-level analytics. Acceptance criteria should include keyboard access, captions, alternative text, readable structure, privacy controls and export of evidence. Technology is selected only when it improves a defined pedagogical function.

Limitations and Future Research

The article presents a conceptual and design result. It does not establish causal effectiveness, optimal scenario duration, component weights or threshold scores. The framework requires contextualisation for programme language, institutional resources, student experience and the populations served. Some evidence informing simulation design originates in health professions; transfer to special-educator preparation should be tested rather than assumed.

Future research should proceed in stages: expert content validation; participatory review with persons with disabilities, families and practising special educators; accessibility and usability testing; pilot analysis of case clarity and cognitive load; inter-rater reliability of performance rubrics; and a quasi-experimental study comparing the methodology with a content-equivalent course. Outcomes should

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include pre- and post-transfer tasks, confidence intervals and effect sizes, portfolio revision quality, stakeholder ratings and qualitative evidence about agency, fairness, authenticity and workload.

Research should also examine which decisions benefit from automated support and which require human or stakeholder judgment. Particular attention is needed to novelty effects, observer reactivity, performance anxiety, cultural assumptions in scenarios, excessive data collection and the possibility that simulation success does not transfer to real placements. Longitudinal evidence from supervised practice would provide the strongest test of professional usefulness.

Conclusion

Practical competence of pre-service special educators is an integrated capacity to analyse evidence, design an inclusive corrective-developmental response, act adaptively, collaborate with learners and stakeholders, use accessible tools, and revise decisions on ethical and evidential grounds.

The proposed methodology links eight stages – competence mapping, case briefing, diagnostic reasoning, decision design, professional simulation, structured debriefing, redesign and reperformance, and transfer assessment. Its value lies in the traceable relationship among intended outcomes, authentic action, observation, feedback and correction.

Implementation requires bounded professional problems, explicit learner voice, graduated scaffolding, structured collaboration, debriefing followed by reperformance, multi-evidence assessment, accessibility, privacy and human oversight. Future empirical validation should determine whether these conditions improve transfer to real special-education practice while preserving dignity, fairness and learner agency.

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