Revamping, Reforming, and Redesigning K-12 Pre-service Teacher Curricula: Improving Feedback Practices in Teacher-In-Residency (TIR) Programs

Paula Miller, Ph.D.

Can clinical educators be change agents in revamping, reforming, and redesigning K-12 pre-service Teacher-In-Residency (TIR) programs? Clinical educators or teacher-educators have pivotal roles in coaching and supporting the pre-service teachers' learning development throughout their two-year TIR coursework journeys. Not only are the pre-service teachers on a learning pathway, but clinical educators are also building knowledge by honing in on where pre-service teachers are in their learning and understanding their needs in achieving success in K-12 classrooms.

This case study explored a Teacher-in-Residency (TIR) program at a midwestern university with programs in two metropolitan areas across a state. This TIR program is a 2-year internship and full-time work for pre-service teachers seeking certification. Additionally, this program is an alternative teacher certification program where pre-service teachers work full-time in K-12 school districts and are supervised and coached by clinical educators. For this study, clinical educators provided the certification coursework (Practicum I Fall 2023 Summative Assessment) and observed pre-service teachers through the GoReact video program. They provided feedback in rating pre-service teacher performance with the Missouri Educator Evaluation System (MEES) Teacher Standard One: Content Knowledge rubric (DESE, 2023; GoReact, 2024).

Revamping, reforming, and redesigning a Teacher-In-Residency (TIR) program is the primary aim of this exploratory case study. The researcher (e.g., a post-doctoral fellow) and the TIR administration were trying to understand the extent to which clinical educators were using the Learning by Scientific Design (LbSD) framework (Deans for Impact, 2015) to provide feedback to pre-service teachers during their performance evaluation on the Missouri Educator Evaluation System (MEES), Standard One: Content knowledge aligned with appropriate instruction (DESE, 2023). The goal of the

case study was to strengthen the TIR program as it expands and includes future apprenticeship programs to systematically embed learning science content and evidenced-based instructional coaching practices across the TIR curricula.

Teacher-In-Residency (TIR) Program Problem of Practice Introduction

For this study, the TIR Program Problem of Practice (PoP) addresses the lack of systematic implementation of learning science content and instructional coaching across the pre-service teacher preparation curriculum. This POP aims to improve TIR clinical educators' instructional coaching and feedback to TIR pre-service teachers. Specifically, this TIR PoP focuses on supporting K -12 TIR pre-service teachers, using evidence-based data from the LbSD framework in alignment with MEES Standard One (MEES - DESE, 2023) to address teacher education preparation program improvement needs. It also aims to enhance the TIR clinical educators' coaching skills by providing specific feedback to TIR pre-service teachers and aligning feedback with core interventions embedded in Learning by Scientific Design (LbSD) and Teacher Actions, Cognitive Coaching forms of feedback (e.g., self-actualization with data and mediative questioning), and with the Missouri Educator Evaluation System, Standard One, content knowledge aligned with appropriate instruction (MEES - DESE, 2023; Costa &, Garston, 2023). The primary goal is for university supervisors to implement instructional coaching aligned with Cognitive Coaching and Learning by Scientific Design (LbSD) principles to improve pre-service teacher performance on the Missouri Educator Evaluation System (MEES) performance assessment for teacher certification. The Missouri Department of Elementary and Secondary Education (DESE) and Missouri Educator Preparation Programs collaboratively developed the MEES for teachers. The MEES assesses pre-teachers' ability on nine standards and thirty-six quality indicators to apply knowledge in authentic educational settings, determining their eligibility for certification (Missouri DESE, 2023).

For this study, the fellow conducted a thematic analysis (Braun & Clarke, 2024) on the instructors' written comments related to 1) alignment with Cognitive Coaching and its five forms of feedback and 2) adherence to Learning by Scientific Design (DFI, 2020) principles and teacher actions

aimed at supporting pre-service teacher performance on the MEES for teachers Standard One: Content Knowledge. The intent is to inform the refinement of professional learning experiences for university instructors and revisions to the TIR coursework curriculum. Enhancing university instructor practices, in turn, aims to enhance the support provided to pre-service teachers in their preparation as teachers.

According to the Deans for Impact (2015), the LBSD encoding framework model is how people learn by transferring information from working memory and storing information in long-term memory. Systematic execution is needed for the six core Learning LbSD principles: 1) Managing the Learning Load; 2) Connecting the Dots; 3) Deepening Meaning and Learning; 4) Practicing with a Purpose; 5) Building Feedback Loops; and 6) Creating a Motivating Environment. The Cognitive Coaching forms of feedback (e.g., judgment, personal observations, inferences, data, and mediative questioning) provide guidelines for clinical educators to provide evaluative or self-actualizing feedback. According to Costa and Garston (2023), it is more beneficial for student learning for teachers to provide more specific feedback with data and mediative questioning to develop self-directed learning.

For this case study, the fellow focused on three LbSD principles that aligned with the Missouri Educator Evaluation System (MEES), Standard One, which were 1) Managing the Learning Load, 2) Connecting the Dots, and 3) Deepening Meaning and Learning. These LbSD principles provide the initial structure for a comprehensive TIR program, allowing for directives on lesson planning and lesson delivery to support the needs of K-12 students. Specific feedback is essential, especially when aligning the Learning by Scientific Design (LbSD) framework with the MEES standards. Thus, clinical educators coaching with feedback to pre-service teachers will assist with using the LbSD framework to improve the TIR clinical educator feedback practices.

Research Questions

To address the PoP, the following research questions were derived based on the need to improve supporting K-12 pre-service teachers' professional development experiences with the LbSD framework and the MEES Standard One and to enhance clinical educators' coaching practices with core interventions for specific feedback:

1. To what extent are the clinical educators using the LbSD Framework and Cognitive Coaching forms of feedback (e.g., judgment, personal observations, inferences, data, or meditative questions) within their feedback to pre-service teachers?
2. Which LbSD principles do clinical educators perceive they use the most?

Methodology

A qualitative, thematic case study research design was chosen to understand clinical educators' instructional coaching feedback experiences and how meaning is interpreted through their lived experiences (Merriam, 2015; Creswell & Creswell, 2018). In collaboration with the TIR Director and administration, the fellow investigated the clinical educators' perceptions to understand how they provided feedback to pre-service teachers and how they interpreted their experiences when delivering feedback when using the MEES Standard One rubric.

Instrumentation

Three primary instruments were used to collect data for this case study. First, the GoReact observation video transcript provided by the TIR administration was used. The fellow imported the transcript into an Excel spreadsheet, which included thirty-five feedback comments from three clinical educators to pre-service teachers. Secondly, the Zoom Communications program was utilized to videotape clinical educators' interviews and to transcribe interview data in real time. Finally, the fellow used the semi-structured interview style to assist with open-ended questioning for the flexibility of clinical educators' responses (See Table 1) sample below. Examples of the clinical educator responses are mentioned in this paper's findings and discussion section.

Table 1

Sample Practicum 1 Fall 2023 - TIR Coach (A, G, T) Zoom Interview Questions

Interview Questions
1. How did your university's professional development on Cognitive Coaching training prepare you?
2. What progress have you made in implementing more specific feedback to TIR teacher-candidates?
3. Describe any examples of student progress with more specific feedback provided (e.g., with Cognitive Coaching forms of feedback: data and mediative questioning feedback to TIR teacher-candidates).
4. What have you observed are the feedback patterns of your comments to TIR-teacher-candidates on the MEES teacher assessment within the GoReact platform?
5. What would have been your ideal instructor comment alignment with the cognitive coaching forms of feedback (evaluative or self-directed) and the LbSD (i.e., DML, CD, MLL, PWP, BFL, or CME) principles and teacher actions?
6. Is there anything else you would like to share that you feel would be beneficial to improving student learning experiences?

The fellow also addressed the research questions by filtering three TIR clinical educators' feedback comments (e.g., from GoReact, GoReact, 2024) and queried only by the Excel program's Missouri Educator Evaluation System (MEES) Standard One. Next, the fellow aligned thirty-five clinical educators' feedback comments with identified common themes with the cognitive coaching forms of feedback, LbSD framework, teacher actions, and MEES indicators (See Table 3).

MEES Teacher Standard One (DESE, 2023) was used to provide a rating for each TIR pre-service teacher's performance. In the GoReact program (GoReact, 2024), clinical educators created a 5-point scale (MEES Standard One, DESE, 2023) rubric score and administered it while observing pre-service teachers. TIR administration queried the Practicum I Fall Summative Assessment file within the GoReact program, which included the clinical educator's comments and MEES Teacher Standard One scores. Practicum I TIR pre-service teachers completed the MEES teacher summative assessment during Fall

2023. Clinical educators used a rubric to score the MEES, which includes nine standards or core criteria novice teachers should demonstrate. Within each standard are indicators specifying criteria aligned with each standard. Standards are scored on a 5-point scale, with the anchor zero equaling the teacher-candidate does not possess the necessary knowledge; therefore, the standard is not evident or is incorrect in performance, and four equals the teacher candidate adapts and develops the lesson according to the teaching environment/student response (Missouri DESE, 2023).

Additionally, the university instructors provided open-ended comments at the end of each standard. University instructors also provide marker feedback within GoReact that is aligned with MEES standards and indicators. The fellow reviewed the marker feedback but did not include it in the analysis of this study. Pre-service teachers uploaded videos of their classroom teaching and an accompanying lesson plan to GoReact to provide MEES data. Three university instructors (e.g., clinical educator/or coach) served as the study sample and gave pre-teacher (n = 35) feedback on their videos of classroom teaching and lesson plans using the MEES rubric uploaded within GoReact. The fellow renamed each university instructor with a pseudonym (Coach A, B, G, or T) aligned with their feedback. Furthermore, the fellow transferred the GoReact Excel file into a database.

Data Collection

The data collection procedures took place from November 2023 through February 2024. Three TIR clinical educators (e.g. Coaches A, B, and T were selected to participate in the study that taught the Practicum I Fall 2023 capstone course). Later, coaches A, B, G, and T were chosen to participate in 1-hour interviews (e.g., Coach B was unavailable). They were all female and identified as Black, Hispanic, and White. They hold advanced degrees in education: three have Doctor of Philosophy degrees, and one has a Doctor of Education degree. Three of the clinical educators have 19 years of experience in K-12 education and 27 years in post-secondary education as instructors. One clinical educator also has six years of K-12 instructional coaching and four years of K-12 school administration experience.

The Fall 2023 MEES Summative Assessment was given to all TIR pre-service teachers enrolled in the Practicum 1 Fall 2023 course. This study focuses on three university clinical educators who

provided feedback to 35 pre-service teachers (n=35) on their classroom instruction related to MEES Standard One: Content Knowledge. TIR clinical educators used the GoReact video annotation software (VAS) platform to observe classrooms and provide feedback to pre-service teachers online or offline through comments, written, spoken video recordings, or live media (Ardley & Hallare, 2020; GoReact, 2024). Clinical educators scored GoReact videos using the MEES Standard One 5-point scale rubric and provided open-ended comments. The clinical educators also provided data on their perceptions during interviews of how they gave feedback to their pre-service teacher students. The clinical educator interviews lasted one hour and were audiotaped and transcribed by Zoom. The fellow created a color-coded Excel database for data analysis based on the data collected from the interviews and the MEES Standard One rubric feedback comments from GoReact.

The fellow collected and analyzed the GoReact video observation data and aligned it with three Learning Science by Design (LbSD) principles (e.g., Deepening Meaning and Learning, Managing the Learning Load, and Connecting the Dots), coaching feedback, and the Missouri Educator Evaluation System, Standard One (MEES) (Missouri DESE, 2023). Thus, data collection was administered and focused on the clinical educators' feedback using markers aligned to the MEES scoring rubric to rate TIR pre-service teacher-student teaching performance (Missouri DESE, 2023).

Findings and Discussion

In answering the research question, 1) To what extent are the clinical educators using the LbSD Framework and Cognitive Coaching feedback forms (e.g., judgment, personal observations, inferences, data, or meditative questions) within their feedback to pre-service teachers? The researcher used thematic analysis to identify common themes across the three university instructors and their comments provided to pre-service teachers on the MEES for teacher assessment Standard One: Content Knowledge. The Missouri DESE (2023) defines MEES Standard One as, "The teacher candidate understands the central concepts, structures, and tools of inquiry of the discipline(s) and creates learning experiences that make these aspects of the subject matter meaningful and engaging for students. Four indicators are related to standard one, including 1.1 Vocabulary and Terminology, 1.2 Content Delivery, 1.3 Student Application

of Content, and 1.4 Student Engagement with Content (Missouri DESE, 2023). As mentioned, this content aligns with LbSD principles and teacher actions related to Deepening Meaning and Learning, Connecting the Dots, and Managing the Learning Load. Table 2 below shows the alignment of LbSD principles and teacher actions to MEES Standard One indicators.

Table 2

Alignment of LbSD Principles and Teachers Actions and MEES Standard One Indicators

LbSD Principle	LbSD Teacher Action	MEES Standard One Indicator
Managing the Learning Load	1A-Teachers intentionally sequence tasks to include opportunities to build foundational concepts before moving on to more advanced tasks.	1.2 Content Delivery
	1B-Teachers scaffold student understanding through carefully designed instructions that include modeling explanation, thinking aloud, and worked examples.	1.2 Content Delivery
Connecting the Dots	2A- Teachers prompt students to make explicit connections between new ideas and prior knowledge.	1.4 Student Engagement with Content
Deepening Meaning and Learning	3A-Teachers select tasks that require students to focus their attention on the meaning of content.	1.1 Vocabulary and Terminology 1.2 Content Delivery
	3B-Teachers questions and tasks require students to engage in effortful thinking.	1.4 Student Engagement with Content
	3C-Teachers prompt students to connect (and distinguish) varied examples and contrasting non-examples.	1.3 Student Application of Content

Note. N=35 From "Leveraging Technology for Effective Instructional Coaching Feedback Aligned with Cognitive Coaching and Learning by Scientific Design Principles and Teacher Actions in a Teacher-in-Residence Program," *by*

N. Bolton and Paula Miller, 2024, Society for Information Technology & Teacher Education International Conference (pp.1986-1995). Association for the Advancement of Computing in Education (AACE).

The data analysis also showed how common feedback themes aligned with Learning Science by Design (LbSD), teacher actions with MEES Content Standard One, and coaching cognitive feedback forms aligned with MEES Standard One (Table 3). *Personal Observation* feedback is used by Coach T, who advised the pre-service teacher on teaching strategies that may not hold for others (Thinking Collaborative, LLC, 2023).

Table 3

Sample Practicum 1 Fall 2023 TIR Coach Feedback Form by Theme, MEES Standard One, LbSD Principle, and LbSD Teacher Action

CC Forms of Feedback	Example Coach T's Feedback Content knowledge aligned with appropriate instruction	LbSD Principle	LbSD Teacher Action	MEES Indicator
Personal Observation	The majority of the discussion was focused on them answering your questions student to teacher. More student to student discussion could have pushed the lesson from them simply parroting your and the video's ideas to them really demonstrating their understanding of the material.	Deepening Meaning and Learning	3B – Teacher questions and tasks require students to engage in effortful thinking.	1.1 Vocabulary and Terminology

Note. N=35 From "Leveraging Technology for Effective Instructional Coaching Feedback Aligned with Cognitive Coaching and Learning by Scientific Design Principles and Teacher Actions in a Teacher-in-Residence Program," *by N. Bolton and Paula Miller, 2024, Society for Information Technology & Teacher Education International Conference (pp. 1986-1995). Association for the Advancement of Computing in Education (AACE).*

Additionally, clinical educator comments were analyzed for their alignment and frequency to 1) Cognitive Coaching and the five forms of feedback and 2) Science of Learning principles and teacher actions to support pre-service teacher performance on the MEES for teachers. Data analysis also included the fellow creating a codebook to show the alignment between coach comment to pre-service teacher, thematic analysis theme, Cognitive Coaching form of feedback, LbSD principle and teacher action, and MEES Standard One indicator alignment (See Table 4). Coach A contributed remarks to eleven applicants, Coach B to nine candidates, and Coach T to fifteen (Table 4).

Table 4

Practicum 1 Fall 2023 TIR Coach Feedback - Frequencies of Identified Themes and Alignment to Cognitive Coaching and Learning by Scientific Design

		Frequency Coach T	Frequency Coach B	Frequency Coach A
Thematic Analysis Themes	Teaching Strategies	10	7	6
	Student Engagement	4	0	2
	Collaborative Learning	1	0	0
	Appropriate Instruction	0	2	1
	Communication	0	0	1
	Classroom Management	0	0	1
Cognitive Coaching Forms of Feedback	Evaluation (Judgment, Inferences, Personal Observation)	9	8	9
	Coaching (Data and Mediating Questions)	6	1	2
Learning by Scientific Design: Connecting the Dots	Teacher Action: Teachers prompt students to make explicit connections between new ideas and prior knowledge.	1	1	0
Learning by Scientific Design: Managing the Learning Load	Teacher Action: Teachers intentionally sequence tasks to include opportunities to build foundational concepts before moving on to more advanced tasks.	1	1	2
	Teacher Action: Teachers scaffold student understanding through carefully designed instructions that include modeling explanations, thinking aloud, and worked examples.	1	4	1

		Frequency Coach T	Frequency Coach B	Frequency Coach A
Learning by Scientific Design: Deepening Meaning and Learning	Teacher Action: Teachers select tasks that require students to focus their attention on the meaning of content.	9	3	4
	Teacher Action: Teachers' questions and tasks require students to engage in effortful thinking.	3	0	0
	Teacher Action: Teachers prompt students to connect (and distinguish) varied examples and contrasting non-examples.	0	0	2

Note. N=35 From "Leveraging Technology for Effective Instructional Coaching Feedback Aligned with Cognitive Coaching and Learning by Scientific Design Principles and Teacher Actions in a Teacher-in-Residence Program," *by N. Bolton and Paula Miller, 2024, Society for Information Technology & Teacher Education International Conference (pp. 1986-1995). Association for the Advancement of Computing in Education (AACE).*

Table 4 of the GoReact transcript identifies six themes from clinical educators that align with LbSD principles: Deepening Meaning and Learning (DML), Managing the Learning Load (MLL), and Connecting the Dots (CTD) (Deans of Impact, 2015). These themes include Teaching Strategies, Student Engagement, Collaborative Learning, Appropriate Instruction, Communication, and Classroom Management. Most educators' feedback emphasized DML, particularly in teaching strategies, which focus on using examples and non-examples to enhance understanding. Bolton and Miller (2022) highlight that DML encourages students to reflect on material meaning. Three key actions support DML: designing tasks to focus on essential content, using deep-level questions to foster critical thinking, and employing examples to clarify concepts. Educators noted that pre-service teachers can improve understanding by facilitating discussions and prompting effortful thinking, encouraging analysis and justification of key ideas (Deans of Impact, 2022).

Unlike the MEES Standard One - GoReact transcript findings, the fellow noted that only two out of three clinical educators (CEs) perceived the Connecting the Dots principle as applied in lesson planning and delivery. This principle emphasizes linking new ideas to existing knowledge, with teachers prompting

students to access relevant prior knowledge (American Psychological Association, 2020). This approach aligns with constructivist theories, which stress building on existing cognitive structures for effective learning (Vygotsky, 1978; Chand, 2024). By facilitating connections between added information and prior understanding, educators enhance comprehension (Bransford, Brown, & Cocking, 2000). Coaches T and G indicated that this principle is primarily addressed through feedback to prevent mere regurgitation of information. Additionally, 33% of CEs noted alignment between the Deepening Meaning and Learning (DML) principle and their feedback, particularly as pre-service teachers helped students distinguish examples from non-examples using the Gradual Release of Responsibility Model (Fisher et al., 2016). In contrast, no CEs linked feedback to the Managing the Learning Load principle, which addresses cognitive overload from excessive information or distractions (Sweller, 1994).

Results from the Zoom interviews and the GoReact transcript report revealed significant discrepancies in clinical educators' perceptions. All coaches claimed to provide meditative feedback to pre-service teachers; however, the GoReact report showed no meditative feedback among the thirty-five comments in the pilot study (see Table 5 and Figure 1). After the fellow summarized the five cognitive feedback forms from Thinking Collaborative (2023), the coaches were asked about their feedback patterns on the MEES teacher assessment within GoReact. All coaches stated they provided data-specific and meditative questioning feedback. Most confirmed familiarity with cognitive coaching and training from other educational institutions, noting differences in naming conventions but a consistent focus on cognitive coaching principles.

Table 5

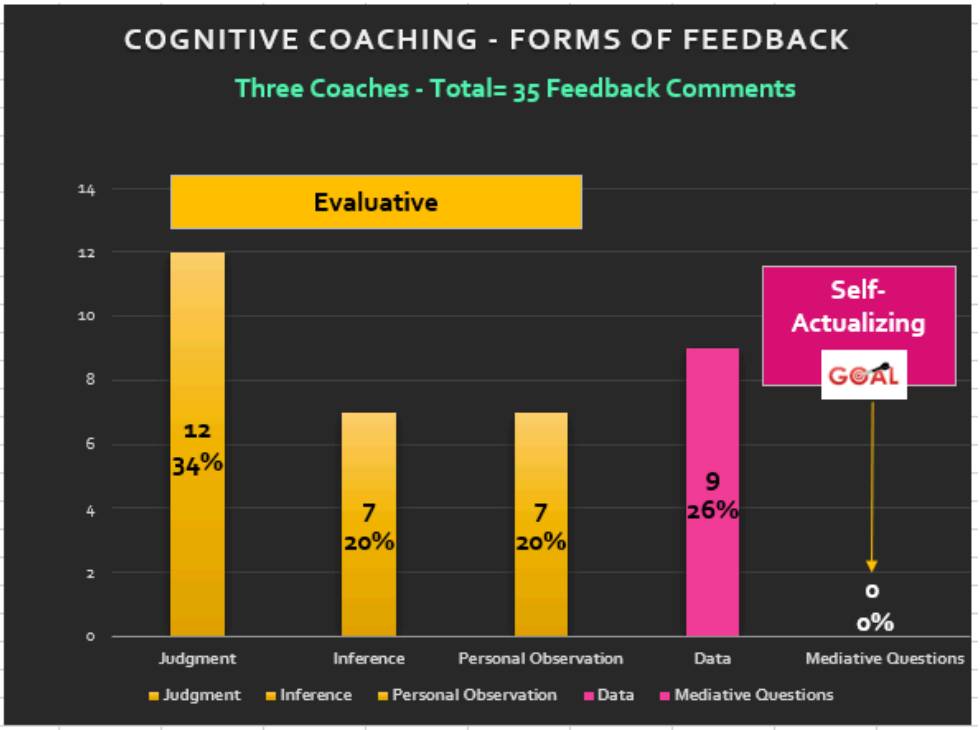
Sample Practicum 1 Fall 2023 TIR Coach Feedback via GoReact vs. TIR Coach Feedback Zoom Interview

	CC Forms of Feedback	Example Coach G's Feedback Content knowledge aligned with appropriate instruction	LbSD Principle	LbSD Teacher Action	MEES Indicator
GoReact Transcript	Personal Observation	"Though this was admittedly a short video, I would have loved to see you directing students to talk with each other, especially in a small group like this..."	Deepening Meaning and Learning	3B – Teacher questions and tasks require students to engage in effortful thinking.	1.2 Content Delivery
Zoom Interview What have you observed are the feedback patterns of your comments to TIR pre-service teachers on the MEES teacher assessment within the GoReact platform?	Mediative Questioning	"Well, you know – how did that work for you? Is there anything that you would change? Are you comfortable with adjusting your lessons?"	Deepening Meaning and Learning	3B – Teacher questions and tasks require students to engage in effortful thinking.	1.2 Content Delivery

According to the results from the analysis of the GoReact feedback comments, there were no meditative questioning comments, but 26 percent of the comments were data-specific (See Figure 1).

Figure 1

Percentage of Coach Feedback Comments via GoReact by Cognitive Coaching Forms of Feedback



Examples of data-specific feedback from the GoReact transcript and clinical educators' perceptions include insights from Participant Coach T, who noted the number of students with their heads down during a lesson. Coaches also provided examples of reflective questioning in their feedback. For instance, Coach A asked, "How did you decide where to start the reading and intervention in the lesson?" Coach G reflected on mediative coaching, saying, "Is there anything you would change? What does it look like when you try to push the same lesson on different class periods with different students?" Overall, clinical educators indicated (e.g., during the interviews) that meditative, reflective questioning was utilized while scoring the MEES Standard One assessment (DESE, 2023).

Implications, Recommendations, and Conclusions

Building a comprehensive teacher preparation program is crucial for redesigning the TIR curricula. Plans are in place to enhance the curriculum with a stronger focus on the LbSD

framework and to set clear expectations for clinical educators regarding self-actualizing feedback. MEES and LbSD surveys will be implemented to evaluate the effectiveness of the redesigned curriculum. Recommendations for revamping the TIR program include:

1. Prioritizing learning science content by aligning the curriculum with MEES Standards and fostering mediative feedback.
2. Surveys will be conducted to assess LbSD content knowledge in curriculum delivery through feedback to TIR pre-service teachers.
3. Performing trend analysis to compare Year One Fall Practicum 1 with Spring Practicum 2 assessments to evaluate improvements in learning science and knowledge application based on the MEES rubric.

The study also highlighted the need to improve feedback for TIR pre-service teachers by incorporating LbSD principles (Deans for Impact, 2015), specifically by offering:

1. Specific feedback at the indicator level using GoReact MEES marker feedback (GoReact, 2024).
2. More cognitive coaching and coaching-style feedback from clinical educators (Costa & Garmston, 2023).
3. Professional development aimed at better integrating LbSD principles with MEES Standard One Content Knowledge indicators across the curriculum (Costa & Garmston, 2023; DESE, 2023).

Further research will focus on:

1. The alignment and feedback patterns of MEES standards two through nine.

2. The perspectives of all clinical educators and pre-service teachers on GoReact assessment tasks to enhance TIR programs (GoReact, 2024).
3. A longitudinal study examining how feedback from clinical educators evolves.

References

American Psychological Association. (2020). Publication manual of the American Psychological Association (7th ed.). https:/doi.org/10.1037/0000165-000

Ardley, J., & Hallare, M. (2020). The feedback cycle: Lessons learned with video annotation software during student teaching. *Journal of Educational Technology Systems,49*(1), 95-96. https://doi.org/10.1177/0047239520912343

Bolton, N., & Miller, P. (2024). Leveraging Technology for Effective Instructional Coaching Feedback Aligned with Cognitive Coaching and Learning by Scientific Design Principles and Teacher Actions in a Teacher-in-Residence Program. In *Society for Information Technology & Teacher Education International Conference* (pp. 1986-1995). Association for the Advancement of Computing in Education (AACE).

Braun, V., & Clarke, V. (2024). Supporting best practice in reflexive thematic analysis reporting in Palliative Medicine: A review of published research and introduction to the Reflexive Thematic Analysis Reporting Guidelines (RTARG). *Palliative Medicine*, *38*(6), 608-616.

Costa, A. L., & Garmston, R. (2023). *Cognitive coaching seminars foundation training: Learning guide.* Thinking Collaborative, LLC.

Chand, Satish. (2024). Constructivism in Education: Exploring the Contributions of Piaget, Vygotsky, and Bruner. International Journal of Science and Research (IJSR). 12. 274-278. 10.21275/SR23630021800.

Creswell, J., & Creswell, J. (2018). Research design: Qualitative, quantitative, and mixed methods approaches. *The Selection of a Research Approach* (15th ed, pp. 13, 205), Sage.

Deans for Impact (2015). *The science of learning*. Austin TX: Deans for Impact.

Deans for Impact (2022). *The science of learning*. Austin TX: Deans for Impact.

Fisher, D., Frey, N., & Hattie, J. (2016). *Visible Learning for Literacy, Grades K-12: Implementing the Practices That Work Best to Accelerate Student Learning.* Corwin Press.

Missouri Department of Elementary and Secondary Education (DESE) (2023). MEES teacher candidate assessment rubric. https://dese.mo.gov/media/pdf/mees-teacher-candidate-assessment-rubric-2023

Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. Learning and Instruction, 4(4), 295–312.

Thinking Collaborative. (2024) Maximum capacity in individuals and organizations: Five forms of feedback. Thinking Collaborative. https://www.thinkingcollaborative.com/stj/five-forms-of-feedback

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