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BOONE, NORTH CAROLINA

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By: **George W. Wolford**, Ethan J. Wash, Ashley R. McMillon, and Arianna N. LaCroix

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How does training format and clinical education model impact fidelity and confidence in a speech-language pathology rotation?

George W. Wolford[1,2] · Ethan J. Wash[2] · Ashley R. McMillon[2] · Arianna N. LaCroix[3]

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Clinical education rotations typically involve an initial training phase followed by supervised clinical practice. However, little research has explored the separate contributions of each component to the development of student confidence and treatment fidelity. The dual purpose of this study was to compare the impact of clinical training format (synchronous vs. asynchronous) and education model (traditional vs. collaborative) on student confidence and treatment fidelity. Thirty-six speech-language pathology graduate students completed this two-phase study during a one-term clinical rotation. Phase 1 investigated the impact of training condition (synchronous, asynchronous guided, asynchronous unguided) on student confidence and treatment fidelity. Phase 2 explored the impact of education model (traditional vs. collaborative) on student confidence and treatment fidelity. Treatment fidelity was measured at the conclusion of Phases 1 and 2. Students rated their confidence at six-time points throughout the study. Our results indicate that training condition did not differentially impact student confidence or treatment fidelity; however, education model did: students in the collaborative education model reported increased confidence compared to students in the traditional education model. Students in the collaborative education model also trended towards having higher treatment fidelity than students in the traditional education model. These results demonstrate that pre-clinical trainings can be effective in several different formats provided they cover the discrete skills needed for the clinical rotation. While preliminary, our results further suggest that students may benefit from working with peers during their clinical rotations.

Keywords Asynchronous training · Clinical education · Peer-assisted clinical education · Student confidence · Synchronous training · Treatment fidelity

Introduction

The allied health professions use supervised clinical rotations to help graduate students transfer academic knowledge into clinical practice. Clinical rotations are foundational to the development of independent practitioners as didactic coursework alone is insufficient to teach students all the skills needed for clinical practice (e.g., Pauly-O'Neil & Prion, 2013; Rapillard et al., 2019). To bolster a student's clinical skills in the areas directly related to a particular rotation, clinical educators often conduct structured trainings before the clinical rotation. These pre-clinical trainings are delivered in a variety of formats including synchronously or asynchronously (Maloney et al., 2013; Sinclair et al., 2016). After training, students engage in supervised clinical practice, which involves students working individually with a clinical educator (i.e., the traditional education model) or in groups (i.e., a type of collaborative education model) to provide client care (Barrett et al., 2021; Beveridge & Pentland, 2020; Lekkas et al., 2007). Yet, research on the structure of the initial pre-clinical training and the type of education model that result in the highest student competence and confidence is limited (Sinclair et al., 2016; Markowski et al., 2021). This study adds to the current literature by separately assessing the impact of pre-clinical trainings and the type of clinical education model on student confidence and treatment fidelity within the context of speech-language pathology (SLP) graduate student education; moreover, the results provide important insights for how to prepare allied health students more generally for clinical practice.

Pre-clinical training

Theoretical models of clinical education recommend that students engage in an orientation or training prior to the start of their clinical rotation (e.g., Anderson, 1988; Miller, 1990; Stoltenberg & McNeill, 2011). These trainings are often delivered synchronously and require students to demonstrate the skills needed for the clinical rotation, often through simulation (Barnard et al., 2011; Donaldson, 2015; Finch et al., 2013; Medina et al., 2008; Pauly-O'Neil & Prion, 2013). Students who participate in such synchronous trainings demonstrate greater confidence and higher levels of competency than their untrained counterparts (Barnard et al., 2011; Medina et al., 2008). When implemented correctly, these intensive, multi-day pre-clinical trainings yield similar competency levels as an entire clinical rotation (Cunningham et al., 2016). Unfortunately, synchronous trainings are often limited by the availability of resources at a given placement (Chang et al., 2014; Iverson et al., 2021; Major et al., 2020).

Asynchronous trainings are a flexible alternative to resource intensive synchronous trainings (Sinclair et al., 2016). Across several health professions, asynchronous trainings have been shown to be equivalent to synchronous education and more effective than no instruction (Chang et al., 2014; Cook et al., 2008; Iverson et al., 2021; Major et al., 2020; Sinclair et al., 2016), particularly when they include frequent instructor and peer interactions (Swan, 2003) and engaging content (Chen et al., 2006; Maloney et al., 2013). Many asynchronous trainings are developed and guided by clinical educators. Yet, students also access educational resources available through online social media sites (e.g., YouTube; Sutherland & Jalali, 2017) to augment their clinical knowledge (Boster & McCarthy, 2018). Unfortunately, empirical or observable outcomes resulting from these unguided social media searches are lacking (Sutherland & Jalali, 2017), as are those stemming

from asynchronous trainings developed by clinical educators. Thus, additional research is needed to investigate the impact of pre-clinical training formats, including social media resources, on clinical skill development using empirical measures such as a skills checklist during a simulation.

Clinical education model

The most frequently used education model in the allied health disciplines is the traditional education model. The traditional education model involves one student providing services under the supervision of one clinical educator (e.g., Barrett et al., 2021; Beveridge & Pentland, 2020; Sheepway et al., 2011). Alternatives to the traditional model are collaborative education models. There are several types of collaborative education models, however, the "2:1" model is the most common within many allied health professions (though see nursing's use of Dedicated Education Units; Markowski et al., 2021). In the 2:1 model, two students work together to provide supervised services to one client under the supervision of one clinical educator (Barrett et al., 2021; Markowski et al., 2021; Sevenhuysen et al., 2017; Sheepway et al., 2011). This collaborative education model stems from peer-assisted learning (Henning et al., 2008; Markowski et al., 2021), which draws heavily on social learning theory (Bandura, 1977) and constructivism (Kalina & Powell, 2009; Vygotsky, 1962). The goal of the collaborative model is for students to learn from their peers in addition to the clinical educator (Markowski et al., 2021).

Multiple reviews across the healthcare disciplines have found that the traditional and collaborative education models produce largely similar student outcomes with proper clinical educator training (Briffa & Porter, 2013; Henning et al., 2008; Lekkas et al., 2007; Sevenhuysen et al., 2017). However, these reviews highlight the overreliance on student participants to report on their own performance as the primary outcome measure (Briffa & Porter, 2013; Lekkas et al., 2007; Markowski et al., 2021; Secomb, 2008). These self-reported outcome measures focus on student confidence, also referred to as self-efficacy (e.g., Bandura, 1977; de Diego-Lázaro et al., 2020; Meyer & Sternberger, 2005), which broadly relates to a student's belief in their ability to execute a particular skill (Bandura, 1977; Gottlieb et al., 2022). It is important to measure confidence because confidence influences behaviors in ways that are difficult to predict based on empirical data alone and being underconfident or overconfident is problematic for quality client care (Gottlieb et al., 2022). However, confidence ratings should be interpreted with caution as confidence is not always a good predictor of competence (Clance & Imes, 1978; Dunning, 2011; Eva & Regehr, 2005, 2011). Notably, studies that include empirical outcomes of student performance show a slight advantage of collaborative models over traditional models (DeClute & Ladyshewsky, 1993; Iwasiw & Goldenberg, 1993). This nuance in the literature necessitates a comparison of how a 2:1 collaborative model compares to the traditional model when empirical performance and confidence are both measured.

Present study

Speech-Language Pathology graduate programs have historically used the traditional education model, yet the onset of the covid-19 pandemic promoted the use of a 2:1 collaborative model (ASHA, n.d., 2020a, b; Anderson, 1988; Dudding et al., 2017; Polovoy & Law, 2020 April; Sheepway et al., 2011). This sudden shift in clinical education practice patterns allowed for a direct comparison between the traditional and 2:1 collaborative education

models. The purpose of this study was to examine the impact of pre-clinical training procedures (synchronous vs. asynchronous) and educational model (traditional vs. collaborative) on student treatment fidelity (an empirical measure of student performance) and confidence within the context of speech-language pathology graduate student education.

The study was divided into two phases mirroring a typical clinical rotation. In Phase 1, we compared student treatment fidelity and confidence across three pre-clinical trainings: a synchronous lecture, an asynchronous guided lecture developed by a clinical educator, and an asynchronous unguided video from social media. In Phase 2, we compared student treatment fidelity and confidence across the traditional and collaborative education models. We hypothesized that by the end of Phase 1, students in the synchronous training condition would experience similar levels of confidence and treatment fidelity as students who watched an asynchronous training designed and recorded by the clinical educator (i.e., asynchronous guided training). We also expected that the synchronous and asynchronous guided groups would have increased confidence and treatment fidelity compared to the students who watched a freely available social media resource (i.e., asynchronous unguided training). By the end of Phase 2, we hypothesized that students participating in the collaborative education model would have increased confidence ratings and treatment fidelity compared to students in the traditional education model. We also hypothesized that student confidence would not predict treatment fidelity at the end of Phase 2.

Methods

Participants

Forty-four graduate SLP students (42 female) participated in this study. Thirty-six students were quasi-randomly assigned to participate in the study as part of their university clinical practicum experience by a faculty member who's job responsibilities included assigning students to clinical practicum experiences. Importantly, this faculty member was blind to study specifics beyond knowing the protocol involved language treatment in aphasia. Therefore, students were assigned to the study like any other placement (e.g., aphasia experience was needed). An additional eight students volunteered to participate in the study as part of the control group. All participants' demographic data is reported in Table 1. Students gave written informed consent and were not compensated for study participation. All procedures were approved by Midwestern University's Institutional Review Board.

Procedure

The general structure of the program, termed "Aphasia Camp", was consistent for all participants and is depicted in Fig. 1 in stages: pre-camp orientation, training procedures (Phase 1), supervised clinical practice (Phase 2), and post-camp. The two phases took place over nine weeks and were implemented with five separate cohorts (described below). During pre-camp, students attended a brief orientation with the clinical educators to provide general information about study logistics (e.g., scheduling) and expectations. No training regarding the content of the study occurred during the brief orientation. After the orientation, students completed their first (T1) of six confidence surveys using the Aphasia Camp Confidence Rating Scale (ACCRS; Appendix A).

Table 1 Participant demographics by cohort and training condition

	Age	N	UG SLP Major (%)*	UG GPA	GRE-Verb	GRE-Quant	Aphasia Course Grade	Prior Aphasia Client (%)**	Cum Clock Hours***
Cohort									
Collaborative	25 (1.72)	18	72	3.29 (.20)	147.33 (5.67)	146.56 (4.36)	89.41 (5.00)	16	73.89 (16.05)
Collaborative 1	*25 (1.95)*	*12*	*58*	*3.28 (.20)*	*147.25 (6.18)*	*147.5 (3.58)*	*90.08 (3.92)*	*0*	*64.36 (7.66)*
Collaborative 2	*25 (1.27)*	*6*	*100*	*3.32 (.22)*	*147.5 (5.01)*	*144.67 (5.47)*	*87.83 (6.52)*	*50*	*92.99 (9.53)*
Traditional	25 (2.83)	18	88.89	3.41 (.21)	149.39 (5.33)	145.11 (4.61)	88 (3.93)	33	33.52 (33.79)
Traditional 1	*24.17 (2.64)*	*6*	*83.33*	*3.45 (.21)*	*151.33 (3.50)*	*144.67 (3.72)*	*87.83 (3.76)*	*0*	*0 (0)*
Traditional 2	*24.67 (3.56)*	*6*	*100*	*3.52 (.25)*	*149.83 (6.18)*	*146.5 (2.95)*	*89 (2.83)*	*66*	*30.97 (5.67)*
Traditional 3	*26.17 (2.77)*	*6*	*83.33*	*3.27 (.26)*	*147 (5.24)*	*144.17 (6.50)*	*87.17 (5.19)*	*33*	*69.59 (12.15)*
Training condition									
Synchronous	25.05 (2.65)	18	77.78	3.36 (.23)	148.83 (5.96)	145.61 (4.58)	88 (4.85)	27.78	50.61 (29.22)
Asynchronous Guided	25 (2.50)	9	88.89	3.4 (.28)	149.22 (5.54)	145.11 (5.40)	87.11 (3.76)	50	36.73 (34.74)
Asynchronous Unguided	24.89 (1.45)	9	66.67	3.29 (.21)	146.56 (5.08)	147.00 (2.96)	91.56 (2.65)	0	76.90 (18.58)
Control group									
Control	25.38 (2.83)	8	83.33	3.43 (.11)	148.38 (5.33)	142.13 (4.55)	84.38 (2.88)	75	79.99 (12.58)

N = number of participants, UG = undergraduate, SLP = speech-language pathology, GRE = Graduate Record Exam™, Cum Clock hours = cumulative clock hours. Values presented are means of the group with standard deviations noted in parentheticals except where noted with a percentage sign and asterisk

Underline denotes different groupings of participants. The demographics of specific cohort rotations are denoted in italics under the aggregated traditional and collaborative cohort headings

*Indicates the percentage of participants who majored in speech and hearing sciences or communication disorders

**Indicates the percentage of participants who reported working with a client with aphasia at the graduate level

***Includes all treatment and assessment hours in all disorder areas plus undergraduate hours (if any), but not observation hours, completed before the start of the clinical rotation. The collaborative cohorts both had approximately 30 simulation hours

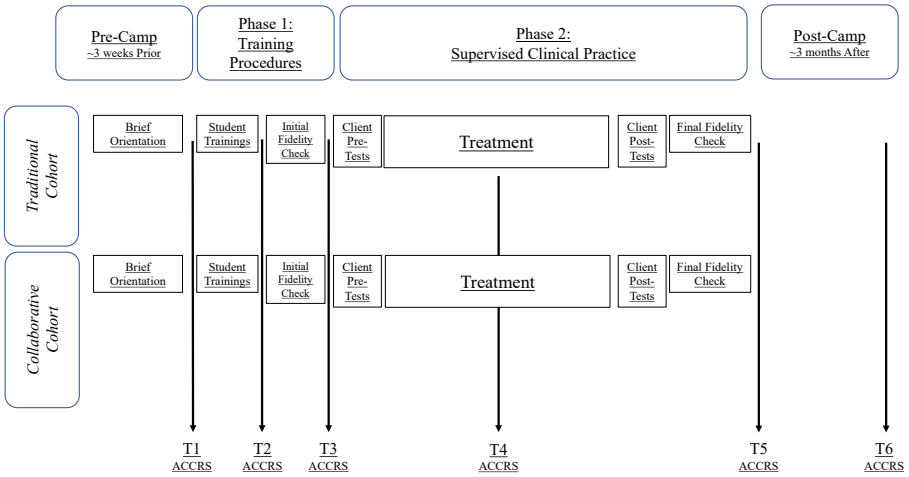

Fig. 1 Visual schematic of the training and treatment experiences for both the traditional and collaborative cohorts

Phase 1: pre clinical training

The purpose of Phase 1 was to train students to implement the treatment intervention, Verb Network Strengthening Treatment (VNeST). All students were initially provided with clinically relevant readings about aphasia (Helm-Estabrooks et al., 2013, Chapters 3 and 21) and assigned to summarize an article (Edmonds et al., 2009) to promote student understanding of the theory behind the treatment intervention. Students were also provided with a data sheet that included a copy of the treatment protocol from Edmonds et al. (2009). Students were then randomly assigned to one of three didactic only training conditions by the last author: synchronous, asynchronous guided, and asynchronous unguided.[1] The asynchronous trainings were assigned to different cohorts to minimize contamination effects (e.g., sharing videos). This resulted in 50% of students receiving the synchronous training, 25% the asynchronous guided training, and 25% the asynchronous unguided training.

The synchronous group received one hour of direct training on VNeST from the primary clinical educator. This training included the clinical educator providing students with the treatment's theoretical background and direct instruction in how to administer VNeST (e.g., discussing the steps, providing examples). Students could ask questions of the clinical educator during this training only.

The asynchronous guided training was designed by the primary clinical educator to mimic the synchronous training. In the asynchronous guided training, the clinical educator discussed the theory behind the treatment and administration steps with examples. The asynchronous guided training required students to attend to the content for a comparable amount of time as the synchronous training; however, students did not have the opportunity to ask in the moment questions of the clinical educator.

[1] All students also received a second training in Supported Conversation for Adults with Aphasia (SCA; Kagan et al., 2001); however, this paper solely focuses on VNeST due to unbalanced SCA experiences between the cohorts.

Students assigned to the asynchronous unguided training group watched a freely available, seven-minute YouTube video on VNeST (Watford, 2017). This video was chosen as it represents the type of online media resource students access to familiarize themselves with treatment approaches in the absence of guided training from the clinical educator (Boster & McCarthy, 2018). The asynchronous unguided training focused on treatment administration and did not discuss theory or provide students the opportunity to ask questions. The asynchronous unguided training covered all administration steps, except for one item, which was removed from scoring (discussed below).

The T2 ACCRS was administered after the students read the assigned readings and completed the VNeST training. After completing the training and ACCRS, students demonstrated their knowledge of the VNeST protocol in a simulated learning experience with the primary clinical educator; this timepoint is referred to as the initial fidelity check hereafter.[2] The primary clinical educator assessed student adherence to the VNeST protocol using the VNeST Fidelity Checklist (described below; see Conlon et al., 2020) and provided synchronous, individualized corrective feedback on performance, though the student's treatment fidelity percentage was not shared. After the initial fidelity check, students completed the T3 ACCRS before Phase 2 began.

Phase 2: supervised clinical practice

Once trained, Phase 2 began, which was supervised clinical practice. Phase 2 consisted of pre- and post-treatment assessments and VNeST treatment. Three clinical educators were involved with treatment supervision, though one primary clinical educator (EJW), supervised approximately 75% of the treatment sessions across all cohorts; other clinical educators were involved in supervision due to scheduling considerations (e.g., illness). Students completed the T4 ACCRS midway through treatment, and the T5 ACCRS after treatment concluded. The T4 and T5[3] ACCRS also included self-reflection questions regarding student performance in the clinical practicum experience. An analysis and discussion of the self-reflection data is beyond the scope of this paper but is planned. After all client contact concluded, the primary clinical educator assessed student adherence to the VNeST protocol at a final time point via a repeat of the first simulated experience; this is referred to as the final fidelity check hereafter. Students completed the T6 ACCRS approximately three months after T5.

Clinical education model Cohort assignment to an educational model was dictated by ASHA and University changes in regulations at the start of each clinical practicum experience. This resulted in the first two cohorts being assigned to the collaborative education model and the last three cohorts to the traditional education model.

Traditional cohorts Students who participated in the traditional education model provided individual and group treatment to one client with aphasia during the study. These students were prescribed to provide two hours of individual VNeST therapy and one hour of group therapy per day. The individual sessions involved one student working with one client with aphasia. The

[2] Two initial treatment fidelity data points are missing due to video recording errors: one in the asynchronous unguided group and one in the synchronous group. These two participants are excluded from the analyses in Phase 1.

[3] One T5 data point from traditional cohort 3 is missing due to a data collection error.

group therapy sessions included three students working with three clients with aphasia using methodology unrelated to VNeST. Individual treatment sessions were supervised ~ 40% of the time, similar to the typical standard of supervision in the field (Donaldson, 2015; Uhl et al., 1987), and individualized feedback was given for 30 min each day in a group format. Though a group debrief is unconventional in the traditional education model, we used this format due to scheduling constraints and similarity of the protocol. Of the three traditional cohorts, only traditional cohort 3 saw clients in-person. The three traditional cohorts are treated as a single group since our dependent measures of interest, treatment fidelity ($F[2,15] = 1.40$, $p = 0.28$) and confidence (VNeST: $F[2,14] = 0.38$, $p = 0.688$; SLP: $F[2,14] = 2.94$, $p = 0.086$), did not differ across the three cohorts.

Collaborative cohorts Students who participated in the collaborative education model, which was delivered entirely via telehealth, were paired for treatment, and instructed to share and support each other with all clinical responsibilities. Students in the collaborative cohorts provided two hours of individual VNeST therapy per day, alternating who was delivering instruction within each session; this resulted in each student directly administering the protocol for approximately one hour per day. Each session was supervised 100% of the time to be consistent with speech-language pathology education guidelines at the time. Group therapy was not delivered due to technological restraints associated with the initial switch to the telehealth platform. However, students implemented a brief 10-min SCA protocol in between the two hours of VNeST (rather than group therapy) to provide a break for the clients. Written feedback was delivered immediately via in-session messaging, and each pair of students additionally participated in a 15-min debrief with the clinical educator after their sessions ended for the day.

Unlike the traditional model, students in the collaborative model each saw two clients with aphasia during the practicum experience. This difference was implemented to control for the amount of direct VNeST administration time across the traditional and collaborative groups. Each cohort, except collaborative cohort 2, was scheduled for 16 h of direct VNeST treatment (Table 2). The two collaborative cohorts are treated as a single group since our dependent measures of interest, treatment fidelity ($t[6.56] = 1.76$, $p = 0.12$) and student confidence ratings at T5 (VNeST: $t[8.45] = 0.42$, $p = 0.69$; SLP: $t[6.03] = 1.12$, $p = 0.31$), did not differ between the two groups.

Control group The control group was recruited from students participating in typical clinical rotations within the university clinic. The department targets approximately 3–4 h of treatment per week per student and primarily provides a traditional educational model. Their exact experiences were not controlled for in an attempt to provide a contrast to an ecologically valid clinical rotation experience. The control group completed the ACCRS at the same six-time points as the traditional and collaborative cohorts. Participants in the control group were already seeing clients during the T2 and T3 time points in accordance with typical university clinic procedures. The control group did not complete the initial or final fidelity checks.

Outcome measures

Aphasia camp confidence rating scale

Confidence was selected as our first outcome measure because it provides important insights into a student's understanding of a situation that cannot be empirically observed. We developed the Aphasia Camp Confidence Rating Scale (ACCRS; Appendix A) to

Table 2 Clinical hours and experiences by cohort within each clinical rotation

	Collaborative 1 ($n=12$)	Collaborative 2 ($n=6$)	Traditional 1 ($n=6$)	Traditional 2 ($n=6$)	Traditional 3 ($n=6$)
Clients per student	2	2	1	1	1
VNeST Treatment Hours*	32	60	16	16	16
VNeST Direct Admin Hours**	16	30	16	16	16
Treatment Days Per Week	2	4	2	2	2
Service Delivery	Teletherapy	Teletherapy	Teletherapy	Teletherapy	In-Person
SCA Delivery	Individual	Individual	Group	Group	Group
Supervision (percentage)	100	100	40	40	40
Debrief Structure	Paired	Paired	Group	Group	Group
Debrief Frequency (mins/day)	15	15	30	30	30

*Number of face-to-face hours each student had with clients throughout the clinical practicum

**Number of hours each student spent administering the VNeST protocol

measure student confidence. The ACCRS asks students to rate their confidence with performing a task on a 100-point scale (Bandura, 1977; Finch et al., 2013; Rudolf et al., 1983). Questions were phrased similarly to Rudolf et al. (1983) and two questions about general task performance were also used (ACCRS items 10 and 11). The ACCRS was administered using RedCap survey software (Harris et al., 2019). The scale ranged from 0 to 100 with "0" being "not confident at all" and "100" being "very confident." Students used the sliders in the RedCap survey software to select their confidence rating for each question. The ACCRS can be divided into specific subscales including confidence specific to VNeST (VNeST; internal consistency across all time points: $\alpha = 0.98$, 2 items) and confidence in general SLP practice skills (SLP; internal consistency across all time points: $\alpha = 0.86$, 3 items). Although internal consistency on the entire scale was strong ($\alpha = 0.94$, 18 items), we solely focus on the SLP and VNeST subscales as VNeST was the skillset students were expected to learn during the clinical rotation, while general SLP skills such as lesson planning and documentation were targeted minimally.

VNeST fidelity checklist

Treatment fidelity was chosen as the second outcome measure since it represents the targeted skillset students should learn during the clinical rotation. The VNeST fidelity checklist was developed based on the one reported by Conlon et al. (2020) who used the checklist to investigate experienced clinicians' adherence to the VNeST protocol. The content of the checklist covered the major aspects of VNeST and performance was synthesized as percentage correct. We adopted this procedure by scoring an item as 1 (correctly administered an item), 0 (incorrectly administered or skipped an obligatory item), or NA (when a cueing contingency was not triggered).

The initial fidelity check, during Phase 1, measured the student's ability to implement the VNeST protocol post- initial training but before the first treatment session (between the T2 and T3 confidence ratings). The final fidelity check was completed after treatment concluded at the T5 confidence rating. The initial and final fidelity checks were completed with the clinical educator who played the role of a person with aphasia during the simulation; the same case was used for all students at the initial and final fidelity checks. Corrective feedback was provided by the clinical educator after the simulation was completed. Though acceptable variations of VNeST were used in treatment, students were instructed to implement the generic protocol for the final fidelity check.

Inter-rater reliability was completed on 10% of the fidelity checklist data; the two raters had 97% agreement (kappa = 0.89). One rater was blind to training and cohort; the other rater was aware of the clinical education model but not the training condition. One item, the step 3 cueing hierarchy, was removed from the fidelity analyses due to it not being emphasized in detail by the clinical educator in the synchronous or asynchronous guided trainings. Similarly, the step 3 cueing hierarchy was not discussed in the asynchronous unguided training (Watford, 2017). This lack of emphasis in any training resulted in students prompting the client to re-read only the clause with the error rather than the whole sentence.

Statistical analysis

All analyses were conducted using R statistical software (R Core Team, 2021) in RStudio version 4.3.1. The "afex" package (Singmann et al., 2021) was used to conduct Type

III mixed ANOVA models. The Greenhouse–Geisser correction was used when sphericity was violated. Pairwise comparisons were conducted using paired-sample *t*-tests of the estimated marginal means with the Holm correction in the "emmeans" package (Lenth, 2022).

Phase 1: impact of training condition on student confidence and initial treatment fidelity

For Phase 1, the confidence data from the ACCRS VNeST and SLP confidence subscales were analyzed using mixed ANOVAs with four levels of training group (synchronous, asynchronous guided, asynchronous unguided, control) and two time points (T1, T2). We used a one-way ANOVA with three levels of training group (synchronous, asynchronous guided, asynchronous unguided) to assess the impact of training condition on initial treatment fidelity.

Phase 2: impact of educational model on student confidence and treatment fidelity

The confidence data was analyzed using a mixed ANOVA with three levels of education model (traditional, collaborative, control) and four time points (T3, T4, T5, T6). Final VNeST treatment fidelity was analyzed using a mixed ANOVA with two levels of education model (traditional, collaborative) and two levels of Time (Initial, Final). An exploratory multiple regression was used to predict final treatment fidelity from traditionally used psychoeducational predictors (Baggs et al., 2015; Richardson et al., 2020) and study-specific variables. The psychoeducational variables included undergraduate GPA, GRE (average of quantitative and verbal scores), aphasia course grade, and clock hours before the experience. The study-specific variables included T5 VNeST confidence and training condition.

Results

Phase 1: impact of training condition on student confidence and initial fidelity

For VNeST confidence, the main effect of training group was significant, $F(3, 38) = 2.87$, $p = 0.049$, $\eta^2_G = 0.155$; however, post-hoc comparisons did not reach significance ($p > 0.05$). The main effect of time was also significant ($F[1, 38] = 38.91$, $p < 0.001$, $\eta^2_G = 0.165$): overall student confidence with VNeST increased from T1 ($M = 34$, $SD = 23.6$) to T2 ($M = 53.9$, $SD = 25.5$). The training group x time interaction was also significant ($F[3, 38] = 7.19$, $p < 0.001$, $\eta^2_G = 0.099$): all groups were similarly confident with VNeST at T1. At T2, students in the synchronous, $t(38) = 4.46$, $p < 0.001$, asynchronous guided $t(38) = 2.78$, $p = 0.03$, and asynchronous unguided conditions, $t(38) = 4.58$, $p < 0.001$, were more confident than students in the control group. However, no differences in confidence were observed amongst students in the three experimental conditions ($p > 0.05$).

For SLP confidence, only the main effect of time was significant, $F(1, 38) = 4.43$, $p = 0.042$, $\eta^2_G = 0.015$: all students experienced greater confidence at T2 ($M = 67.6$, $SD = 14.6$) than T1 ($M = 63.5$, $SD = 19.5$). The main effect of training group, $F[3,3] = 1.25$, $p = 0.31$, $\eta^2_G = 0.079$, and the training group x time interaction were not significant ($F[3,38] = 0.90$, $p = 0.45$, $\eta^2_G = 0.009$). See Table 3 for descriptive statistics.

Table 3 Phase 1 Group means and standard deviations for ACCRS subscales

	VNeST confidence		SLP confidence	
	T1	T2	T1	T2
Asynchronous Guided	31.4 *(21.6)*	53.1 *(23.8)*	57.5 *(20.2)*	59.7 *(15.4)*
Asynchronous Unguided	39.3 *(34.1)*	72.4 *(20.2)*	66.6 *(30.9)*	76.6 *(20.0)*
Control	31.3 *(19.2)*	25.6 *(19.9)*	61.8 *(14.9)*	64.4 *(7.56)*
Synchronous	33.9 *(22.4)*	64.6 *(18.8)*	68.0 *(14.4)*	69.8 *(11.9)*

Mean score by measure, time and group are presented above with standard deviations in italics in parentheses

The ANOVA for initial treatment fidelity indicated similar levels of fidelity across the three training groups $F[2, 31] = 0.711$, $p = 0.499$, $\eta^2_G = 0.044$: synchronous ($M = 60.44$, $SD = 19.16$), asynchronous guided ($M = 66.09$, $SD = 15.20$), and asynchronous unguided groups ($M = 56.26$, $SD = 14.11$).

Through visual inspection, we additionally explored potential differences in individual variation within training condition, VNeST confidence at T2, and initial VNeST fidelity ratings (Fig. 2). The scatterplot is divided into quadrants and all groups are represented in all four quadrants. However, only four students (one synchronous, two asynchronous guided, one asynchronous unguided) achieved at least 80% initial fidelity following the initial training. This suggests that training alone does not result in high treatment fidelity. Furthermore, neither "high confidence" quadrant includes a student who achieved over 80% fidelity suggesting that increased confidence does not correspond to high treatment fidelity either.

Phase 2: impact of educational model on student confidence and treatment fidelity

Phase 2: confidence

For the VNeST subscale, the main effects of education model, time, and the education model x time interaction were all significant (see Table 4).[4] For the main effect of education model, the collaborative cohort ($M = 90.2$, $SD = 13.39$) was more confident with VNeST than the traditional cohort ($M = 77.1$, $SD = 19.06$), $p = 0.02$; confirming our hypothesis. The collaborative ($M = 90.2$, $SD = 13.39$) and traditional cohorts ($M = 77.1$, $SD = 19.06$) were both more confident with VNeST than the control group ($M = 33$, $SD = 25.27$), $p < 0.001$. For the main effect of time, confidence differed between all timepoints except T5 ($M = 70.6$, $SD = 30.01$) and T6 ($M = 73.1$ $SD = 23.42$). Interestingly, VNeST confidence was lowest

[4] Overall, there was substantial variability within each group regarding confidence (see Fig. 4). However, only one participant, in the traditional group (the unfilled circle that is furthest left in Fig. 4), was deemed an outlier (i.e., confidence less than three standard deviations below the collaborative and traditional groups' means). To explore the impact that this outlier had on the confidence analyses, we ran the VNeST and SLP confidence ANOVAs with this participant removed. The VNeST confidence results remained consistent with what is reported in Table 4. For SLP confidence, the main effect of Cohort became marginally significant ($F(2,39) = 2.73$, $p = .078$): the trend was for the collaborative cohort to have increased confidence compared to the Traditional cohort with the outlier removed ($t(39) = 2.34$, $p = .074$). All other SLP confidence results remain consistent with what is reported in Table 5.

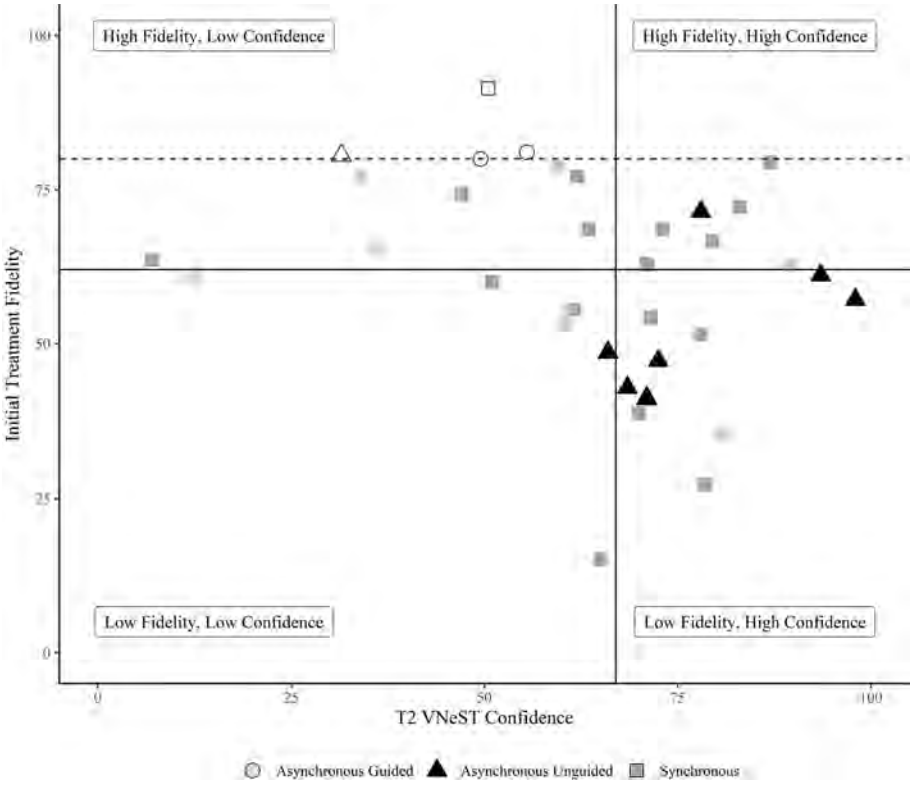

Fig. 2 Scatterplot showing individual variation in student confidence using VNeST at T2 and initial treatment fidelity. Note: The solid lines mark the 50th percentile for confidence (62 confidence) and treatment fidelity (67% fidelity) across all training conditions. The dashed line marks the 80th percentile for treatment fidelity (Conlon et al., 2020). The unfilled shapes represent the students who achieved at least 80% fideltiy on the initial fidelity check

at T3 ($M = 56.8$, $SD = 28.19$), right after the feedback on the fidelity check before clinical practice, and highest at T6 ($M = 73.1$ $SD = 23.42$). The education model x time interaction revealed that all cohorts' confidence differed at all time points (collaborative > traditional > control) except for T5, where the collaborative and traditional cohorts were equivalent (Table 4, Fig. 3).

For SLP confidence, the main effects of education model and time were both significant (Table 5). However, the education model x time interaction was not. As expected, confidence increased for all cohorts across all timepoints. For the main effect of education model, the collaborative cohort was more confident with general SLP skills than the traditional cohort. However, confidence with general SLP skills did not differ between the control group and either educational cohort.

Phase 2: treatment fidelity

The main effect of education model was not significant ($F[1,32] < 0.01$, $p = 0.996$, $\eta^2_G = < 0.01$). The main effect of time was significant ($F[1,32] = 63.06$, $p < 0.001$, $\eta^2_G = 0.49$): final fidelity ($M = 85.7$, $SD = 8.24$) was higher than initial fidelity ($M = 61.0$,

Table 4 Phase 2 ACCRS ANOVA results for student confidence with VNeST and the associated pairwise comparisons

	MSE	df	F	*p*	η^2_G
VNeST Confidence					
Cohort	918.08	2, 40	39.88	< .001*	.598
Time	140.76	2.24, 89.45	18.36	< .001*	.105
Cohort x Time	140.76	4.47, 89.45	3.04	.017*	.037
	Estimate (se)	df	t	*p*	
Pairwise comparisons for the main effect of cohort					
Traditional vs. Collaborative	−13.0 (5.12)	40	−2.54	.02*	
Traditional vs. Control	44.1 (6.50)	40	6.80	< .001*	
Collaborative vs. Control	57.2 (6.44)	40	8.88	< .001*	
	Estimate (*se*)	*df*	*t*	*p*	
Pairwise comparisons for the main effect of time					
T3 vs. T4	−9.63 (1.89)	40	−5.08	< .001*	
T3 vs. T5	−13.80 (2.54)	40	−5.24	< .001*	
T3 vs. T6	−16.25 (3.02)	40	−5.38	< .001*	
T4 vs. T5	−4.18 (1.47)	40	−2.84	.02*	
T4 vs. T6	−6.63 (2.48)	40	−2.67	.02*	
T5 vs. T6	−2.45 (2.45)	40	−1.00	.32	
	Estimate (*se*)	*df*	*t*	*p*	
Pairwise comparisons for the interaction: cohort within time					
T3					
Traditional vs. Collaborative	−16.34 (7.04)	40	−2.32	.03*	
Traditional vs. Control	37.54 (8.92)	40	4.21	< .001*	
Collaborative vs. Control	53.88 (8.84)	40	6.10	< .001*	
T4					
Traditional vs. Collaborative	−12.90 (5.35)	40	−2.41	.02*	
Traditional vs. Control	47.04 (6.78)	40	6.94	< .001*	
Collaborative vs. Control	59.94 (6.72)	40	8.92	< .001*	
T5					
Traditional vs. Collaborative	−9.83 (5.72)	40	−1.72	.09	
Traditional vs. Control	57.56 (7.25)	40	7.94	< .001*	
Collaborative vs. Control	67.39 (7.19)	40	9.37	< .001*	
T6					
Traditional vs. Collaborative	−12.96 (5.49)	40	−2.36	.02*	
Traditional vs. Control	34.45 (6.97)	40	4.95	< .001*	
Collaborative vs. Control	47.41 (6.90)	40	6.87	< .001*	

*Significant at $p < .05$ or less

$SD = 17.0$) for all students. The education model x time interaction was marginally significant ($F[1,32] = 3.86$, $p = 0.058$, $\eta^2_G = 0.054$). Exploratory pairwise comparisons revealed that at the initial time point, the collaborative group ($M = 57.89$, $SD = 16.28$) and traditional

Table 5 ACCRS ANOVA results for student confidence with general SLP skills and the associated pairwise comparisons

	MSE	df	F	*p*	η^2_G
SLP confidence					
Cohort	772.74	2, 40	3.38	.04*	.123
Time	67.78	2.33, 93.05	35.61	< .001*	.131
Cohort x Time	67.78	4.65, 93.05	1.76	.13	.015
	Estimate (*se*)	*df*	*t*-ratio	*p*	
Pairwise comparisons for the main effect of cohort					
Traditional vs. Collaborative	−12.22 (4.70)	40	−2.60	.04*	
Traditional vs. Control	−6.66 (5.96)	40	−1.12	.54	
Collaborative vs. Control	5.56 (5.91)	40	.94	.54	
	Estimate (se)	df	*t*-ratio	*p*	
Pairwise comparisons for the main effect of time					
T3 vs. T4	−7.76 (1.53)	40	−5.09	< .001*	
T3 vs. T5	−11.21 (1.71)	40	−6.57	< .001*	
T3 vs. T6	−16.87 (2.20)	40	−7.66	< .001*	
T4 vs. T5	−3.45 (1.21)	40	−2.86	< .01*	
T4 vs. T6	−9.11 (1.58)	40	−5.76	< .001*	
T5 vs. T6	−5.66 (1.65)	40	−3.43	< .01*	

*Significant at $p < .05$ or less

group ($M = 64.01$, $SD = 17.63$) did not differ, $t[31.80] = 1.05$, $p = 0.30$. At the final time-point, the trend was for the collaborative cohort ($M = 88.54$, $SD = 7.96$) to have higher fidelity than the traditional cohort ($M = 83.26$, $SD = 7.61$), $t[33.93] = 2.03$, $p = 0.05$.

Phase 2: relationship between treatment fidelity and confidence

The overall regression model predicting final treatment fidelity from the psychoeducation and study-related variables was significant (adjusted $R^2 = 0.26$, $F[8, 26] = 2.5$, $p = 0.04$). Full model results are reported in Table 6. The only significant predictor was aphasia course grade ($\beta = 0.68$, $p = 0.04$): students with higher grades in the aphasia didactic course demonstrated higher final treatment fidelity.

Expectedly, final treatment fidelity was not related to student confidence using VNeST at T5. To better understand what might be driving this null relationship, we plotted VNeST confidence at T5 by final treatment fidelity (Fig. 4): 28/36 students achieved at least 80% fidelity at the final time point.[5] Of the students who achieved at least 80% final fidelity, 12 were in the traditional cohort and 16 were in the collaborative cohort. Of the eight students who demonstrated less than 80% final treatment fidelity, six were in the traditional cohort and only two were in the collaborative cohort. Notably, the students with the highest

[5] The student in the traditional cohort whose T5 confidence rating was not collected due to a technical error is not represented in Fig. 4. While this student's confidence is unknown at T5, their T4 VNeST confidence was 87.5, their T6 VNeST confidence was 100, and their final fidelity was 88%.

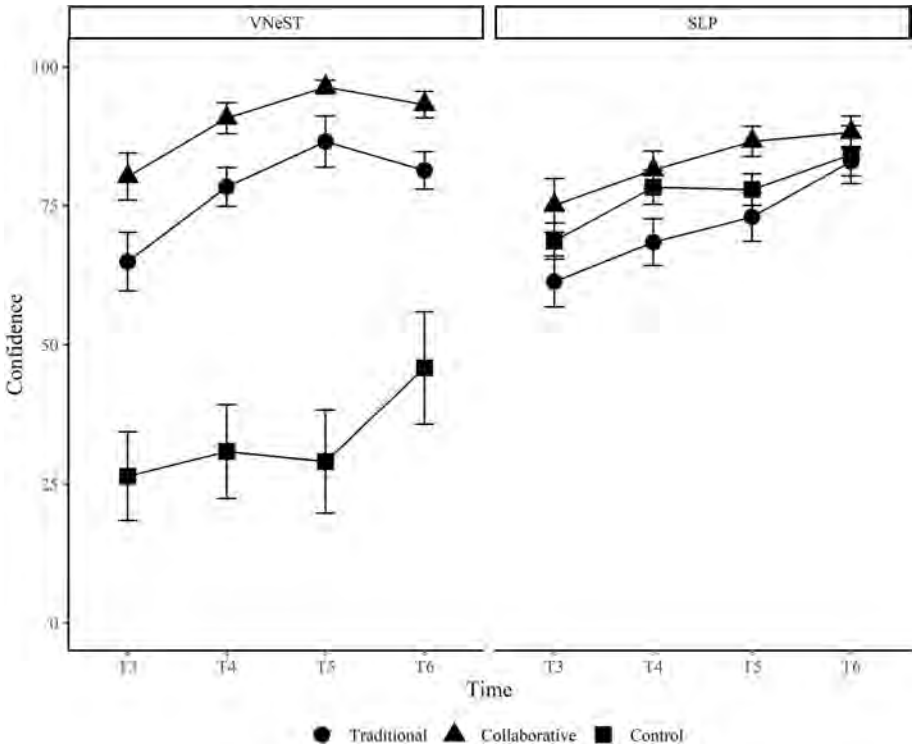

Fig. 3 Phase 2 means and standard errors for VNeST and SLP Confidence by cohort and time point

confidence and final fidelity were in the collaborative cohorts while the students with the lowest VNeST confidence and final fidelity were both in the traditional cohort.

Discussion

The purpose of this study was to explore the impact of training condition (Phase 1) and education model (Phase 2) on student confidence and treatment fidelity. The results of Phase 1 indicate that students who participate in synchronous and asynchronous (both guided and unguided) trainings have similar levels of confidence and treatment fidelity. The results from Phase 2 indicate that a 2:1 collaborative education model may increase student confidence more so than the traditional education model. Neither clinical education model nor confidence with VNeST predicted final treatment fidelity. The implications of these findings for clinical education are discussed below.

Phase I: impact of training condition on student confidence and treatment fidelity

Our hypothesis that the unguided asynchronous training condition would result in lower fidelity and VNeST confidence was not supported. Instead, we found that all three training conditions impacted student confidence and treatment fidelity similarly. But importantly, all trainings increased confidence relative to the control group. The element that all trainings

Table 6 The Phase 2 multiple regression model predicting student's final treatment fidelity from psychoeducational and study-related variables

Variable	Unstandardized β	SE	t	p
Intercept	−21.33	54.20	−.40	.69
Age	−1.12	.56	−1.99	.06
Undergraduate Cumulative GPA	−4.62	6.58	−0.70	.49
GRE (Mean of Verbal and Quantitative)	.60	.32	1.85	.08
Aphasia Course Grade	.68	.32	2.12	.04*
Clock Hours (before experience)	.07	.06	1.13	.27
T5 VNeST Confidence	.01	.15	0.06	.96
Total VNeST Hours	−.21	.15	−1.41	.17
Education Model	6.86	4.84	1.47	.17

SLP confidence at T5 was significantly correlated with VNeST confidence at T5 ($r = .47$, $p < .001$), so only VNeST confidence was included in the model. *Significant at $p < .05$ or less

shared to achieve these results was clear administration instructions for VNeST, including information about when and how to prompt following a client error. These results align with past work (Maloney et al., 2013) and suggest that a shorter, freely available training

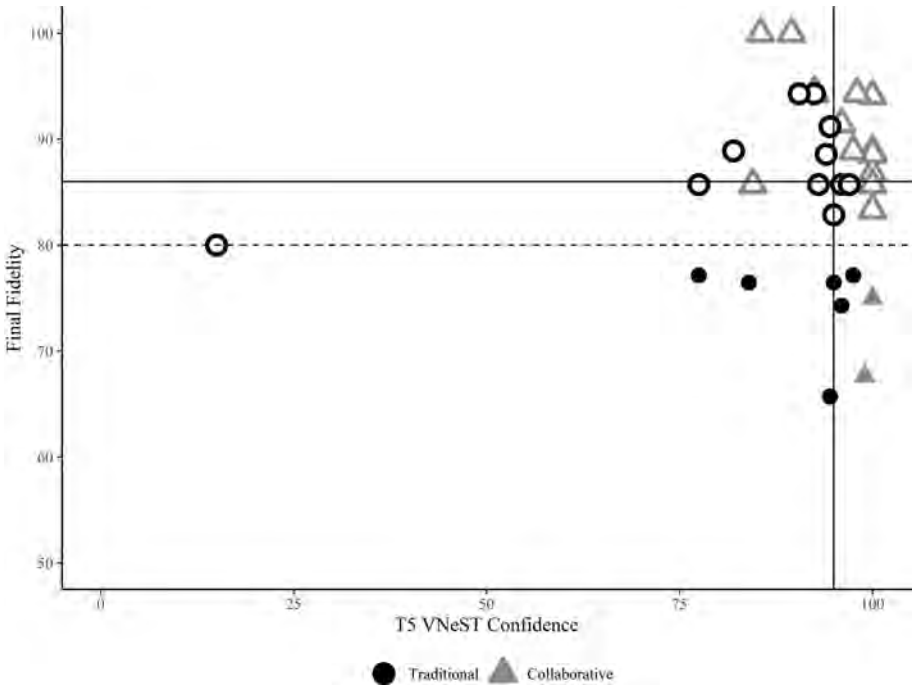

Fig. 4 Scatterplot showing individual variation in student confidence using VNeST at T5 and final treatment fidelity. Note: The solid lines mark the 50th percentile for confidence (95 confidence) and treatment fidelity (86.28% fidelity) across all training conditions. The dashed line marks the 80th percentile for treatment fidelity (Conlon et al., 2020). The unfilled shapes represent the students who achieved at least 80% fideltiy on the final fidelity check

focused on the discrete skills needed for clinical practice may be appropriate to increase confidence when the content is screened for accuracy by the clinical educator. The ability of the asynchronous unguided training to produce similar results as the longer synchronous and asynchronous guided trainings is important since students prefer to watch shorter educational videos rather than lengthier ones (Bordes et al., 2021; Islam, 2020). Thus, programs may be able to address reports that students lack initial confidence by strategically embedding instructions for administration of commonly used interventions within didactic coursework (Finch et al., 2013; Pauly-O'Neil & Prion, 2013; Rapillard et al., 2019).

Each training condition increased student confidence with VNeST more so than control group participation. However, training was not sufficient in 32/36 cases to provide adequate treatment fidelity at the initial simulation (i.e., 80% per Conlon et al., 2020). Therefore, none of the training methods should be considered sufficient for increasing fidelity; this conclusion aligns with previous work (Donaldson, 2015; Herd, 2009; Seal & Hilton, 2007). It is possible that none of the trainings, including the synchronous training, had the key interactive elements to promote high initial fidelity (Malony et al., 2013; Swan, 2003). The synchronous training was initially conceptualized as an interactive training because students had the ability to ask in the moment questions of the clinical educator, but in practice the students asked few questions, and the clinical educator did not work further to promote engagement. The lack of engagement created by the clinical educator is perhaps a critical, yet missing, ingredient from our synchronous training condition.

We did not have a specific hypothesis about how prior experience would impact confidence or initial fidelity. However, the groups varied on several factors including prior experience with aphasia clients and clock hours (Table 1). This variability did not translate into differences in initial fidelity or confidence scores at T1 or T2. This observed variability may not be substantial enough to drive differences at this stage in the student's education; these students were all novice clinicians with under 100 clinical clock hours. Speech-language pathology graduate students are required to have at least 400 clock hours by graduation (ASHA, 2020a). A student with 30 clock hours of experience may not differ substantially from one with 70 clock hours of experience. Likewise, a student who works with a client with aphasia may not necessarily be working on language skills or using the specific VNeST methodology. Future research should investigate individual factors that may predict student confidence and fidelity beyond what is embedded within a clinical practicum experience.

Phase II: impact of clinical education model on student confidence and treatment fidelity

Confidence

Students in both the collaborative and traditional cohorts, but not the control group, reported increased confidence using VNeST during the intervention (T4 and T5) relative to their confidence after training at T3. However, unlike with training condition, we found that the type of clinical education model did impact student confidence. Students in the collaborative cohorts reported significantly higher confidence across all time points, except T5, compared to students in the traditional cohorts. This finding aligns with previous work showing that student confidence increases when collaborative education models are used (Briffa et al., 2013; Markowski et al., 2021; Sevenhuysen et al., 2017). Though this study did not explore what drove student confidence, other studies report that students in

collaborative models report feeling supported by their partner (Dawes & Lambert, 2010), which allows them to work with the partner more easily through minor issues, leaving more time to discuss more complex questions with the clinical educator (Martin et al., 2004). This change in dynamics may therefore promote a greater sense of student independence, leading to higher confidence.

One nuance within the confidence data is that students in the collaborative group reported being more confident at T3 for VNeST specific skills and general SLP skills compared to the traditional group, despite both groups not yet engaging in supervised clinical practice. One may suppose that the students in the collaborative group were generally more confident, but the two groups did not differ on unrelated confidence at T3 ($F[2, 41] = 0.544$, $p = 0.59$), nor on their baseline (T1) VNeST confidence ($F[2,41] = 0.645$, $p = 0.53$). Furthermore, the collaborative cohort did not statistically differ from the traditional cohort on VNeST fidelity, so higher competence was not likely driving their increased confidence. It is therefore possible that students gained confidence from just knowing that they would work with a peer to implement the discrete skills taught in the training during the clinical experience. This hypothesis aligns with educational models such as the cognitive apprenticeship model (Collins, 1987) and Holloway's systems of supervision model (Holloway, 2016), which stress the importance of the student situated experience and learning environment. However, future work is needed to explore factors driving student confidence in collaborative models.

Students in both the collaborative and traditional cohorts demonstrated increased confidence with general SLP skills across time. This result stands in contrast to the training phase where the SLP scale did not significantly increase, suggesting that supervised clinical practice is needed for broader professional confidence. The control group's SLP confidence increased as well, which was expected because they likewise participated in a typical clinical rotation that targeted a broad array of SLP skills including lesson planning, documentation, and researching treatment interventions. In contrast, Aphasia Camp has a relatively narrow scope in terms of general SLP practice patterns, especially with areas probed on the SLP subscale such as documentation and lesson planning. Thus, the substantial degree to which SLP confidence increased in this area during Aphasia Camp was surprising, especially since the students were all towards the beginning of their clinical rotations. Therefore, the final level of confidence being reported by all students for broad SLP skills (i.e., ~ 75% confident) seems to be inappropriately high given their clinical experience at this point. Students possibly interpreted the questions in the scope of their potential performance, or it could also be that student self-assessment of more general competencies is often poor (Eva & Regehr, 2005, 2011), especially when there is a substantial amount that is unknown about a topic (Dunning, 2011). However, this increase is meaningful since higher confidence ratings may lead to future attempts and practice within that domain (Eva & Regehr, 2005).

It is also possible that the ACCRS may be limited in its ability to accurately measure student confidence within a specific area. While the ACCRS contains 18 questions in total, only two of those questions related to VNeST administration (i.e., How confident are you "providing VNeST treatment with fidelity" and "following the VNeST prompting hierarchy?"). Similarly, only three questions related to general SLP skills (i.e., How confident are you "implementing high quality speech/language therapy for all clients," "managing the *in-person* therapy environment," and "taking data while attending to the client?"). Thus, we may not be fully capturing the variability in student confidence with VNeST or general SLP skills using these few questions. Future studies are needed to validate and improve upon the ACCRS as

well as develop general purpose confidence measures for the field because low confidence is a known barrier to entry-level practice (Finch et al., 2013; Wolford et al., 2021).

Treatment fidelity

At the final fidelity check, 28/36 students achieved at least 80% accuracy with the VNeST treatment protocol, which underscores the need for close supervision in real time during treatment to maintain sufficient fidelity for real clients. Though students' final fidelity scores did not significantly differ by clinical education model, the trend was for final treatment fidelity to be higher in the collaborative cohort compared to the traditional cohort, despite similar initial fidelity scores. More students in the collaborative cohort (16/18) also obtained at least 80% accuracy compared to the traditional cohort (12/18).

Interestingly, final treatment fidelity was solely predicted by students' aphasia course grades in the multiple regression model. It therefore could be that student aptitude or motivation for specific content, operationalized through course grade, may be an indicator of treatment fidelity, particularly in students who are just starting their clinical practicums. This hypothesis is reasonable because students who performed well in class in response to modern instructional techniques (Chen et al., 2006; Cook et al., 2019; Moineau et al., 2018) could have developed an effective foundation for increasing fidelity. Alternatively, student motivation to work with a given population has been shown to impact clinical educators' ratings of student competence: students who report increased motivation achieve higher ratings from their clinical educator on evaluations (Ho & Whitehill, 2009). Within speech-language pathology, a given student may only be interested in one of the nine content areas across the lifespan, yet need to learn it all (ASHA, 2020a). Thus, students who are motivated to work with a given population may put forth extra effort in coursework and clinical rotations related to that population, which may explain why the aphasia course grade, not the general academic predictors like GPA or GRE, was linked to final treatment fidelity. Future research should account for student motivation to work with a particular population to better understand what may be driving the relationship between course grade and treatment fidelity.

Relationships between student confidence and treatment fidelity

Student confidence with VNeST and treatment fidelity both increased throughout the clinical experience, but confidence with VNeST did not predict treatment fidelity at the end of Phase 2 (nor at the end of Phase 1: adjusted $R^2 = -0.04$, $F[8, 25] = 0.8267$, $p = 0.59$). This lack of relationship was expected and indicates that students' self-perceptions of their ability to use VNeST are not necessarily indicative of their ability to implement the treatment protocol in a simulated experience after an initial training or after continued clinical practice. Discrepancies between confidence ratings and performance are documented in the speech-language pathology field though are not unidirectional, with some students being good estimators and others over- or under- estimators (e.g., de Diego-Lázaro et al., 2020; Moineau et al., 2018). These differences are also described more broadly in the literature: underestimating one's ability is known as imposter syndrome (Clance & Imes, 1978) while overestimating one's ability is known as the Dunning-Kruger effect (Dunning, 2011).

Issues with self-confidence can lead to mistakes during future client care (Gottlieb et al., 2022). Our results suggests two trends for mitigating issues with self-confidence. First, the role of ongoing practice with frequent individualized feedback may provide mitigating effects, which is important since the more extreme discrepancies between confidence

and performance are present before supervised clinical practice. The second trend is that biases in self-perception may be somewhat mitigated by participation in a collaborative education model. Visual inspection of individual participant data at T5 indicates that the traditional cohort contained the student with the lowest final confidence, but high treatment fidelity (representing imposter phenomenon), as well as the student with the lowest final treatment fidelity, but high confidence (representing the Dunning-Kruger effect). Positive interactions with a partner may therefore protect against imposter phenomenon as feelings of isolation increase the likelihood that a student will exhibit imposter syndrome (Cohen & McConnell, 2019). Future research should investigate if biases in self-perception may be somewhat mitigated by participation in a collaborative education model.

Recommendations for clinical education practice and future research

The results of this study provide some recommendations for improving graduate student clinical education. First, clinical educators should continue to provide students with training at the start of each clinical rotation. This training will ideally occur before students start working with clients and can be synchronous or asynchronous as long as it covers the discrete skills the student needs to be successful in the clinical rotation. However, without a rigorous comprehensive training, a brief training alone is unlikely to be sufficient for immediate high-fidelity practice, so initial treatment sessions should be monitored with supports for high quality client care. These supports should include purposeful feedback within or immediately after each session as the amount of time directly administering the treatment protocol did not seem to impact student confidence or fidelity. Future research should address if adding a more active role to the initial synchronous training yields differences between training conditions.

Second, a collaborative, peer-assisted learning model may also be a viable alternative to a traditional model as it affords students the opportunity to learn from each other in addition to the clinical educator. For example, extra peer support may be beneficial during assessments, early practicum experiences, or with low-incidence or complex clinical populations. However, more research is needed to triangulate confidence and fidelity with other metrics such as self-reflection to further investigate the role having a partner has on confidence before initiating a task.

Conclusion

Overall, our results align with previous work suggesting that supervised clinical practice increases student confidence and clinical skill development (Finch et al., 2013; Gillam et al., 1990). Our results add to the current literature by showing a potential advantage for the collaborative education model over the traditional education model. Our findings also demonstrate that a variety of structured trainings can increase student confidence assuming the training covers the discrete skills the student is expected to demonstrate during clinical practice. However, ongoing supervised clinical practice remains critical to improving treatment fidelity.

Appendix A

Participant ID: _____

Date: _____

Aphasia Camp Confidence Rating Scale (ACCRS)

Not confident at all (0) Very confident (100)

Rate your confidence in…

1. Providing effective individual therapy for persons with aphasia (Aphasia 1)
2. Responding to unexpected events (Unrelated 1)
3. Providing VNeST treatment with fidelity (VNEST 1)
4. Implementing high quality speech/language therapy for all clients (SLP 1)
5. Providing effective group therapy for persons with aphasia (Aphasia 2)
6. Managing the *telehealth* therapy environment (Tele 1)
7. Carrying on a conversation with a stranger in any topic for any amount of time (Unrelated 2)
8. Providing effective therapy via *telehealth* for persons with aphasia (Tele 2)
9. Following Supported Conversation for Adults with Aphasia (SCA) with fidelity (SCA 1)
10. Lifting a 50 pound box (Unrelated 3)
11. Lifting a 200 pound box (Unrelated 4)
12. Providing an effective speech-language evaluation for a person with aphasia (Aphasia 3)
13. Treating a person with aphasia with respect/dignity (Aphasia 4)
14. Managing the *in-person* therapy environment (SLP 2)
15. Taking data while attending to the client (SLP 3)
16. Using SCA strategies to facilitate communication with a person with aphasia (SCA 2)
17. Following the VNeST prompting hierarchy (VNEST 2)
18. Providing an effective speech-language evaluation via *telehealth* for a person with aphasia (Tele 3)

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Data availability A de-identified limited data set that support the findings of this study and the fidelity checklist are available from the corresponding author (G.W.) upon reasonable request.

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

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