


## Factors that influence success when training videofluoroscopic swallowing study analysts

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### ABSTRACT

**Background:** The literature relating to videofluoroscopic swallowing study (VFSS) training is sparse. The available evidence suggests that the learner, environment, and training design might influence VFSS analysts' skill development. **Aims:** To identify the factors that VFSS analysts perceive to influence VFSS training. **Methods & Procedures:** In this qualitative study we interviewed nine speech pathologists from three countries who train VFSS analysts. The interviews followed a semi-structured guide to obtain data describing the trajectory of skill development and the influence of the learner, environment, and training design. We completed a thematic analysis using a simultaneously deductive and inductive approach. **Outcomes & Results:** Participants indicated that they believed that a trainee's clinical experience, cognitive attributes, and learning preferences may influence their skill development. Trainers perceived a need to balance increasing the complexity of the task against maintaining the trainee's confidence. The opportunity to practise and receive feedback was considered important. Barriers to practice were discussed. Training was perceived to have increased in complexity as the field of dysphagia has matured. Participants discussed the interacting demands of time and competency in this evolving environment. **Conclusions & Implications:** VFSS analytical skill development requires an investment of time by the trainee, trainer, and service. Trainers perceived that the trajectory of training and the time taken to reach competency varied according to the trainee, trainer, training design, and training environment factors. Future research into the impact of these influences and training content is needed to identify ways to provide sufficient practice and support learner differences to reduce the costs and time associated with training.

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## Introduction

Training speech pathologists in advanced skills is an inexact science. It is generally accepted that some training is better than none, but there remains little evidence to inform the best ways to invest the considerable monetary and time resources required for training (Edwards, Froude, Sharpe, & Carding, 2021; Tolsgaard et al., 2015). For speech pathologists who manage dysphagia, the analysis and interpretation of videofluoroscopic swallowing studies (VFSS) is one such advanced skill (Taubert, Burns, Ward, McCarthy, & Graham, 2021).

Oropharyngeal dysphagia, resulting from neurological, structural, or respiratory conditions, can have severe consequences (Altman, Yu, & Schaefer, 2010). A person's health can be compromised further by malnutrition, dehydration, choking, or aspiration leading to consequences such as increased morbidity, hospital admission, an extended length of stay, and possible mortality (Altman et al., 2010; Westmark, Melgaard,

Rethmeier, & Ehlers, 2018). In addition to the impact on a person's quality of life and health, these complications are a significant contributor to healthcare resource pressure (Attrill, White, Murray, Hammond, & Doeltgen, 2018). Therefore, early identification and management of dysphagia is important.

Identifying dysphagia at the bedside is challenging. Instrumental assessment coupled with systematic interpretation remains the best method for identifying and informing the management of people with dysphagia (O'Horo, Rogus-Pulia, Garcia-Arguello, Robbins, & Safdar, 2015). Instrumental assessment, including VFSS, requires highly skilled analysts. Variability in the skill of entry-level clinicians for VFSS and dysphagia, in general, is widespread. For example, in New Zealand, entry-level graduates are required to be competent in VFSS analysis, but not in the skill of conducting the study (Miles et al., 2020). In Australia, new graduates acquire both the competency of analysis and the skill of conducting the study while in the

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workforce (The Speech Pathology Association of Australia, 2013). In the UK, foundation skills in dysphagia are acquired by newly qualified clinicians, with VFSS competency requiring specialist training (Royal College of Speech and Language Therapists, 2014). In all cases, skill development in conducting VFSS is acquired by clinicians in the workforce, and heterogeneous teaching models are used depending upon local training requirements and resources (Edwards et al., 2021; Miles et al., 2020; Royal College of Speech and Language Therapists, 2014; The Speech Pathology Association of Australia, 2013).

The evidence relating to VFSS training is sparse, low quality, and heterogeneous (Edwards et al., 2021). Training improves accuracy and reliability in the identification of dysphagia symptoms, but little is known about the best methods to most efficiently and effectively train dysphagia diagnosticians (Edwards et al., 2021; Tolsgaard et al., 2015). In addition, there may be unidentified andragogical and learner-related influences on training (Edwards et al., 2021). Therefore, there is an urgent need to identify the most cost-effective methods of developing competent VFSS analysts to maximise patient health outcomes and reduce the burden of dysphagia and training on health systems.

## Aim

This qualitative study explored the current experiences of speech pathologists who train clinicians in VFSS analysis to identify which factors trainers perceive to influence VFSS training. The common and context-specific experiences of these trainers illuminated a range of factors to consider when planning, delivering, debriefing, and reflecting on the training and instruction provided to speech pathologists conducting VFSS. Implications for service design and future research directions were also explored.

## Method

This study applied a qualitative codebook thematic analysis (Braun, Clarke, Hayfield, & Terry, 2019) to identify factors that might differentiate novice analysts' varied acquisition of VFSS analytical skill, personal factors that might influence skill development, and andragogical factors that might influence skill development.

## Ethical approval

This research was reviewed and approved by an Australian university Human Research Ethics Committee.

## Study design

The perceptions, experiences, and opinions of VFSS trainers were explored using in-depth interviews followed

by thematic analysis as described by Marks and Yardley (2004). The underlying epistemology for the study was an essentialist framework. It was assumed that the language and experience articulated by the participants directly related to their understanding of the influences in training VFSS analysts. The process was scaffolded by Braun and Clarke's (2006) data analysis approach.

## Participants

Qualified speech pathologists who were responsible for VFSS training in their workplace were recruited for this study. Purposeful sampling sought participants with different years of experience from Australia, New Zealand, the UK, the USA, Canada, and South Africa. Speech pathology managers at quaternary, tertiary, and major secondary hospitals were provided with information about the study. To maintain 'arm's length' recruitment, the managers distributed the details to clinicians that were responsible for training others in VFSS, who directly contacted the primary researcher regarding their prospective inclusion. All participants provided written informed consent. No participant withdrew from the study.

This international recruitment effort sought to include a broad range of experiences in training VFSS, within the limitation of the need for interviews to be conducted in English. Ten participants were initially recruited and participated. There were no responses from hospitals in Canada or South Africa. The study design included a provision to extend recruitment if new codes emerged from the data at the end of the initial analysis; no new codes emerged at the end of the study and recruitment was closed. One participant's interview data were discarded due to audio recording failure.

## Data collection

Participants completed semi-structured interviews with the first author. A previous systematic literature search (Edwards et al., 2021) informed the open-ended *a priori* focus areas followed within the interview: the influence of the trainer, trainee, training design, and environment on the development of analytical skills. The corresponding semi-structured interview questions are presented in Table 1. The interviews further explored the emerging evidence that learners have different VFSS training trajectories and

**Table 1.** Semi-structured interview questions.

Please describe how you train people, learning to analyse VFSS images?
Has this changed over time? Why?
Is there anything you would do differently?
What do you think makes for a successful VFSS analyst?
Some people take longer than others to learn the skill – why do you think this is?
In an ideal world, how would we be training VFSS analysts?

that trainee characteristics and the learning environment may explain these differences.

Interviews were conducted by telephone or Skype for Business, with the interviewer keeping field notes during and immediately after the interview. The duration of the interviews ranged from 16:27 to 47:25 min ( $\bar{x}$  = 16:27 min; SD 10:40 min). The interviews were audio recorded and transcribed verbatim by a commercial transcription service. The first author checked the transcripts and corrected technical terms, such as 'glossopharyngeal' and 'MBSImP' (Modified Barium Swallow Impairment Profile; Northern Speech Services, n.d.). Identifying details was removed to protect participant confidentiality. Equipment failure when recording Participant 10's interview meant that transcription was not possible, and the interview data was not included in the analysis.

### Data analysis and interpretation

Data analysis was both deductive and inductive. The *a priori* focus areas derived from the literature formed a broad scaffold for coding. The intent of the analysis was to extend beyond these deductive themes to more fully understand VFSS training. A codebook with sections for the *a priori* areas of interest was collated, and the codebook was extended as interactions between these areas and other patterns were identified. Codes were derived inductively from the data, as there was insufficient evidence in the literature to create a detailed pre-existing coding frame (Marks & Yardley, 2004).

Coding was completed within Word documents and printed for review and audit. Themes were generated by AE, reviewed collaboratively by EF and LD and then consensus was reached between the three researchers during a videoconference. The themes were reviewed against the raw data, described, and sent to participants for member checking. Dysfluent speech, repetitions, and fillers (for example 'um' and 'like') have been removed from the illustrative quotes in this paper for readability.

### Qualitative trustworthiness

Multiple layers of structure and auditing were built into the study design to ensure trustworthiness. The interviews were conducted according to a semi-structured interview guide. All participants were given the questions at the time of invitation to provide time for prior independent reflection. The accuracy of two randomly selected transcriptions was audited by LD. As the data were coded, a codebook with definitions was kept. All coding was reviewed by a researcher independent to the study, with consensus reached on any disagreement. The study design allowed for additional recruitment if new codes emerged from the data near the completion of analysis. All data from the final three

cases were coded with existing codes and, therefore, the sample was considered sufficient. The field notes from the interview with Participant 10 were reviewed, and all data were able to be coded with existing codes. Member checking was employed: participants (including Participant 10) were invited to review the completed thematic analysis. Each participant was emailed a synthesis of codes according to the *a priori* areas of interest with a model of the results (Figure 1) and invited to confirm or suggest changes to the analysis. Five of the 10 participants responded and no changes to the analysis were suggested.

### Participant demographics

Responses were received from 10 clinicians who met the criteria. The majority of respondents had greater than 10 years' experience training others to complete VFSS ( $M$  = 15.5; range = 3–40 years). Respondents gained VFSS training experience in clinical and research contexts in Australia, the UK, the US, and New Zealand. The participants' country and self-reported years of experience training VFSS are included in Table 2.

### Coding, a priori domains, themes, and relationships

All the data derived from interview questions relating to the *a priori* interest areas were considered relevant and coded. Codes were created from the data by AE using the words in the transcripts. The data and codes were reviewed again by the same researcher. Strongly related codes were fused, and a codebook was created and is provided as supporting information. An independent researcher recoded the entire data set using the codebook. Disagreement was resolved by discussion and consensus. After review and discussion, three codes were collapsed into the *learning approach* and *time* codes. Descriptive counts of codes were collected in an Excel spreadsheet, and the *a priori* area of interest was noted for each data point. The counts and distribution of codes amongst interviews are included as supporting information.

Data analysis incorporated a deductive approach according to the areas of interest, with a simultaneous inductive analysis for patterns in the data beyond the pre-identified areas of interest (themes). Codes were integrated by AE into the *a priori* domains: learner and learning environment influences. Emerging themes and their relationships were noted. LD and EF reviewed the codes and the emerging themes within the domains.

### Results

The data revealed four main factors influencing the acquisition of skills and the development of



**Figure 1.** Model of themes and interactions.

competency in VFSS analysis. These factors were trainees, trainers, training approach, and context. The four factors interacted and influenced learning across the trajectory from selecting a trainee through to skill acquisition, the achievement of competency, and then the maintenance of skills. A model of the themes and their interaction can be found in [Figure 1](#).

The learner was identified as being a unified theme. The learning environment data was complex. When reviewed by LD and EF, the learning environment domain was divided into three themes: the characteristics of the trainer, the design of the training, and the learning context. Relationships and interactions within and between the domains and themes were identified by AE and confirmed by LD and EF.

The participants discussed influences on learning, from the beginning expectations of the learner, the system, and the profession, through to the

identification of the learner, the training, and then the maintenance of skills. There were commonalities across these themes. The investment of time and a perceived increase in the complexity of practice were important across each of the data sets. These patterns were inductively identified as themes.

### **Trainee factors**

The participants agreed that in their experience, trainees varied in their trajectory towards competency. The acquisition of foundational skills was universally agreed to be important to the development of accuracy and speed in the VFSS clinic. The learner's understanding of anatomy and physiology was the strongest suggested influence.

if you say how do you teach somebody to interpret a videofluoroscopy, I would say you spend a whole lot of time before you look at a videofluoroscopy talking about biomechanics, and the underlying bits. Where are the muscles and where are the structures and that sort of stuff; because I think just learning to watch things move around on a screen doesn't help people understand swallowing. [Participant 1]

The participants also agreed that clinical experience in dysphagia prepares learners for training.

I've found too is that [when] you have someone who's more experienced clinically, on the ward, and has done some rehab before, they tend to pick it up much more quickly. [Participant 5]

**Table 2.** Participant demographics

Participant	Years		Country
	Training		
1	40		NZ
2	18		New Zealand for two years, the UK 12 years, NSW for 6 years;
3	3		Australia (Rural Qld)
4	16		Australia (WA)
5	16		Australia (Qld)
6	11		Australia (Qld)
7	15		UK; US; Multinational studies
8	17		UK
9	10+		Australia (NSW, QLD) UK
10	10+		UK



Conversely, Participants 2, 8, and 9 also observed that learning to analyse VFSS was valuable for clinicians because the skill enhances clinical practice.

... perhaps [training] shouldn't always be left to the point where you're thinking about analysing videofluoroscopies. I think it's a great way to learn about swallowing, is what I'm trying to say. [Participant 8]

University dysphagia curriculum was also discussed as an influence on the trainee's preparedness for VFSS analysis. Two clinicians commented on the increasing focus in recent years on dysphagia in speech pathology training and referred to receiving just one lecture on dysphagia in their own training.

I qualified eighteen years ago, and swallowing was still seen as the sort of, you know, you were being sent out, being told, 'Don't forget the communications patients,' and that was very much the slant. And we had one lecture on swallowing. [Participant 7]

The importance of undergraduate foundations was highlighted by Participant 6, who observed the difference university training can make to future skill development in dysphagia.

The upskilling clinician that we have in the clinic with us at the moment picked it up very quickly, and she's independent with a lot of things that have taken a lot of other clinicians many more months to become independent with, and she is someone who studied at [university name], and she did problem-based learning ...

And I wonder if that approach that she had to learning in her university degree has given her some advantage into clinical areas where you need to take that kind of approach, and I think videofluoroscopy is one of them. [Participant 6]

Trainees' personal and cognitive characteristics were also suggested as possible influences on training. Most participants discussed the trainees' ability to integrate and synthesise information about the case and their knowledge in relation to the ability to respond online in their clinic, reach a decision, and communicate findings.

And I think, just, some people just going beyond what they see, and find the reason for it. So, just getting that connection. So, a lot of people will say, 'Oh, yeah, I can see vallecular residue.' But why? ... So, just connecting all those things together; some people take a little bit longer. [Participant 5]

Related to this finding was an observation that learners approached training differently. Preferences, such as defaulting to detail over the gestalt, being driven by a hypothesis or working inductively, and a problem-solving mentality were suggested as influencing the person's approach to training and the development of skills.

I would say she was amazing. I think partly because she's somebody who really likes to look at the minutiae, whereas I'm more of a big picture person; she was very happy to spend ages looking at images, going through it, through it, through it. [Participant 4]

Five participants specifically discussed trainee confidence. Being confident was mostly perceived to be positive.

I think some of it is confidence. So when I take people through, say it was their first couple of clinics, and they're coming in the room and they're just observing so that they can learn the different roles of the different professionals, some of them are really keen and say, 'Oh, look, I saw one as a student, I want to jump straight in the room and start feeding the patient.' And other people are very reserved and say, 'No, I just want to sit back; I want to watch for a few weeks.' So I think personality has a lot to do with it; that eagerness to get in and start doing more of the practical skills. [Participant 3]

However, one participant was more cautious about confidence, observing that some trainees were overconfident, which hindered their ability to deal with the unexpected.

So, some people are really overly confident, and they're not prepared to take – I've had the odd one or two people, more the younger people, I would say. So, they're very confident, and I would say, 'Oh, but, you know, what about this?' And it throws them. [Participant 5]

Cognitive skills were also suggested as possible influences on learning. Strong visuo-perceptual skills were most commonly suggested. Four participants suggested that they had observed that some participants could 'see' or 'track' the bolus better than others, and that some had difficulty with this skill.

You might laugh at this, but I also think, visually, people are different. I would sometimes miss an image and not see the same as – as my colleague ... I don't know sort of the technical terms, but I know that people see differently at different depths. I just think that people somehow see the images differently. ... Maybe in 3D, people see; they have more depth profundity or the light, really. I find light, looking at the screen, for my eyes is very difficult as well. [Participant 4]

... when the image is then moving during a swallow, it's just like a big blurry mess for them, and other people just have a very good eye. They can say, 'Oh, that arytenoid looks a bit swollen; I think it impacted on, you know, airway closure during the swallow,' and you'll go back frame by frame and they're absolutely right. [Participant 6]

I would suspect that in the grand scheme of things the ability to interpret a videofluoroscopy is sort of equally represented by intellect and by just your inherent visual skill. [Participant 1]

Flexibility was also offered as a positive cognitive attribute. While a structured approach to learning and training was considered helpful, there was a point at which learners needed to be able to adapt to more complexity. Learners that were responsive to the unexpected and flexible in approach were hypothesised to be able to achieve competency more quickly.

[Some people take longer than others to learn the skill – why do you think this is?] I think it's down to them being too formulaic. [Participant 2]

The clinicians who have been around for a while, they have tended to be more like, 'Oh, well look, I'm not sure. Maybe it's this, maybe,' you know, that sort of – And I think that, to me, is better, because you're looking at alternatives, you're not just thinking, 'It's this'. Tick. Necessarily. [Participant 4]

Similarly, some learners were more comfortable in the busy VFSS environment than others, demonstrating the cognitive skills to cope with a fast and pressured environment.

It is a high-pressure environment. Like you're there you're in another environment. You're not in a speech department. You're in a radiology suite. You've got other professionals there watching. You've got the patient. You're, you know, you're under the pump because of radiation exposure. So I think it can be an environment that you can freeze up in, or get quite flustered, or just lose your place. So it's probably not suited to everyone, potentially. [Participant 9]

### Trainer

The influence of the trainer in decision making about learning, grading, and approach was apparent within the themes discussed above, and explicitly mentioned by the participants. A mentoring model was the standard approach, and the opportunity to work with an experienced clinician was considered a positive influence on trainees. Trainers discussed the increase in complexity that current trainees were facing, with expectations for the outcomes of training being much higher than when the participant had done their own training.

I started here as a locum in 2000 and my very first videofluoroscopy that I did was, I observed the head of department one week, and the following week I had to run the clinic. [Participant 4]

Participant 7 observed that it was important for trainers to take care, and to balance extending participants while not overcomplicating training, which can diminish the trainee's confidence.

... I think you can be complicated – too complicated – by teachers. So I think what people need is, 'It's alright, you've noticed this, and it's really, really important.' You've got to push people to question their analysis, but it needs to be done in a supportive way that

doesn't paralyse people into not being able to make a decision. [Participant 7]

Two clinicians noted that with the trainee's increase in experience, they had to focus on allowing them the opportunity to be independent. The time when the trainee took control of the study was a milestone in their training and required a deliberate withdrawal of scaffolding by the trainer.

That's when I can step out of the room and keep quiet. Which is really hard for me to do! [Participant 5]

All participants spoke positively about leading the training of VFSS analysts, and Participant 7 uniquely identified that a mentor's interest and commitment to training was important for the learning process.

I think, actually, being interested in teaching [is helpful], and it's not everyone's bag. [Participant 7]

### Training design

All participants in the clinical setting reported training new VFSS analysts in a mentor model in the VFSS clinic, with the opportunity to review and reflect after the clinic. An experienced clinician led the training of the trainee. Some sites had participants complete some independent learning prior to attending the clinic, such as reading or commencing the MBSImP. Participants spoke positively about the possibility of providing an opportunity for peer interactions in training. The participants suggested there was an upper limit to the size of groups and that groups had the potential for maximising this use of the trainer's time. However, arranging peer learning also involved logistical challenges of staff availability and time.

I also think big groups are not the way to go about it. I would say a group of five might be perfect. Because they can bounce off of each other and problem solve together without being too intimidated by being in front of a big group and therefore shutting down. [Participant 1]

And I think that also working in pairs or small groups during your training is good as well, if possible, and then you've got other people to bounce ideas off. And from a training point of view, being the trainer, obviously it's more time efficient as well if you're upskilling a couple of people at the same time. [Participant 9]

A standardised competency package and assessment (profession led or organisation specific) was considered important to guide VFSS training. The participants expressed an even greater need for formalised competency requirements in contemporary practice than in the past. This change was attributed to increased expectations from the profession and organisations. Current practice in VFSS analysis was described as more complicated than in the past due

to new research and an expanding knowledge base relating to swallowing physiology and the increased detail required to enable swallowing rehabilitation.

... so where in the past I would have trained someone and expected if they could accurately determine penetration, aspiration, they could roughly determine where the major breakdown was and recommend some kind of rehab, and which probably in the past would always have been strengthening, then that would be a base level com[petence]. Whereas now I guess my expectation of a basically competent clinician ... is more than what it was five years ago because I think that's reflective of where we are with the evidence and where we are with our understanding of interpretation of videofluoroscopy and swallowing, physiology in general. [Participant 6]

The participants discussed how they would grade the tasks and case complexity so that the trainee could develop skills over time. A common starting point was learning clinical skills, such as feeding the client or preparing the food and fluid to trial. Then, participants would have increased involvement in analysis, online decision making in the VFSS suite, and report writing in the clinic.

I do think you've got to have your practical learning. How to run a clinic. You've got to have your practical sticking a thyroid collar on. So your radiation stuff; your texture preparation stuff... help people to understand what's moving and what's happening in that interaction first, to get them confident with that, and then move them onto, well, what does the consultant want to read? [Participant 7]

The amount and frequency of training were discussed by all participants. Skill development required having cases to review and sufficient opportunity to practise and get feedback. Independent practice with past cases was suggested to increase the amount of practice. The frequency and distribution of practice were also discussed. The intensity in the initial stages was suggested as helpful, followed by continued, regular practice. Participant 9 reflected on the impact of the training schedule:

we've done blocks of, like, three months, where that person is coming and staying for the whole clinic, and that does work really well. So, I think that intensity and consistency is really important. I think if you're just coming ad hoc, here and there, it does take much longer to learn, build up that skill. [Participant 9]

Two participants from smaller facilities noted that a barrier to training was the availability of cases, which in turn reduced the intensity of training. Most clinics relied on the referrals each week to provide cases for the trainee. Participant 4 reflected on their experience as a consultant trainer in small facilities:

because I've always used real-time patients ... you have to rely on the people that are coming through

to have their swallow studies. So, sometimes you have a run of nothingness. [Participant 4]

### System and context

The participants discussed how the systems in which they worked influenced the training that was required and possible.

I'm very much reminded of how much [the organisation] requirements, procedures, policies, guidelines, succession planning, all of those things, play a role in how we actually do train clinicians on the ground in [the organisation]. [Participant 6]

The service demands drove training, influencing the trainee selection, the structure of training, and the dose, as exemplified by the quotes from Participants 5 and 8.

I mean the organisation often, be that [Government] or privately, want it wrapped up relatively quickly. [Participant 5]

I guess we're not prescriptive. We just try to fit it in and around what's working best in the service at that particular time. [Participant 8]

Professional and service-level organisations provided resources, which were sometimes helpful, depending upon how they were applied.

... we use the RCSLT videofluoroscopy competencies. So we've got level 1-2-3 practitioners on that front, which I find is very useful. Because you've got to have a framework to work through. But I have to say where I work now at [facility] it's extremely rigid. [Participant 7]

### Time and complexity

Two interrelated themes emerged from the inductive analysis of the data and were apparent within each domain. These are illustrated by the asterisks and overlapping ovals in [Figure 1](#). There was an observation that expectations of VFSS were increasing in the trainers' experiences. There was also a theme that training VFSS required an investment of time from the trainee, trainer, and organisation.

Participants agreed that developing VFSS analytical skill takes time. Having the time, opportunity, and a commitment to practice, both in training and independently, were important factors in the development of VFSS analytical skill for all participants.

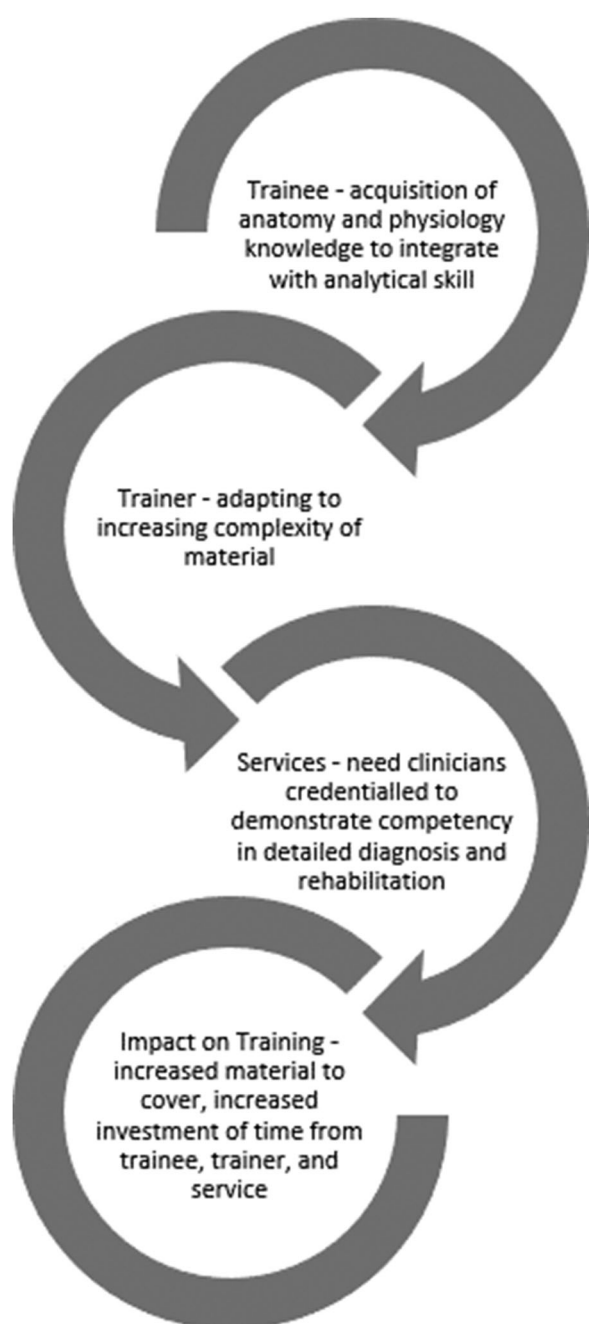
And it's very labour-intensive for me. There are other people that have been working for a few years and want to get their competency, but it's a lot harder and a lot of them give up, really, because you've got to be, I find, in the clinic, weekly, getting the throughput to be able to establish the required levels of experience. [Participant 2]

The participants reported that it took an investment of time to mentor a new trainee. The trainer's available time limited the intensity of training.

I think that training someone in fluoro, the way it is at the moment – and perhaps there'll be a better way in the future – is a very – it's a very time intensive. Time intensive for the trainee and it's time intensive for the trainer. [Participant 6]

I think that intensity is great. So if we could have an intensive week of upskilling, I don't know, for some people that might be too much. But I think it would be something that I'd like to try. [Participant 3]

[Interviewer: In an ideal world, what would we be doing in training our analysts?] [long pause] Have we got time to train people? [Participant 7]



**Figure 2.** Interaction between influences on learning.

The participants observed that while there were competency standards in facilities, development did not end when the mentorship ended. Clinicians also became better at analysis with years of practice.

... there's a couple of people here that ... have got their competencies, but, you know when people get their competencies, they're sort of junior compared to others who have been doing it for ages. [Participant 4]

The increase in skill required of individual clinicians for managing complex clients is paralleled with an increase in the diagnostic specificity enabled by development in research and imaging.

I think probably things have got more complicated. I think when I started we didn't really do hyoids. Um. It was all laryngeal elevation and that was the end of it, you know. I think as we've learnt more, perhaps, we've increased the complexity ... [Participant 7]

Expectations are higher from clinicians as their knowledge increases and reporting is more detailed. Systems build competencies to ensure services match the best available evidence. This in turn creates a more formalised and time-intensive training experience (see [Figure 2](#)).

[In the past] there was no competency, nothing. It was just kind of done in your own time and to your own kind of level, really, and then we started, we went to [professional development on swallowing anatomy, physiology, rehabilitation, and VFSS], we put together a report template; and actually from there we've built from then. We've got a competency now, and anybody new goes through that and is supported throughout, generally by the whole department. [Participant 2]

The learner's own characteristics impact on this time and development. Some learners can progress more quickly through training based on their own personal characteristics. Expertise can develop further with time, and there may be a point at which a person plateaus, to the extent of their own limitations.

Some people will never learn to interpret videofluoroscopies very well. [Or] at least they'll have only marginal skills, whereas other people will just fly through and – and really grasp it quickly. [Participant 1]

## Discussion

This study explored the key influences of VFSS training and skill development through the experiences of clinicians who train VFSS analysis.

The development of VFSS analytical skill described by our participants follows a trajectory that is consistent with the available literature relating to VFSS analytical training and contemporary theories of clinical reasoning (Edwards et al., 2021; Jessee, 2018). Learning is influenced by factors related to the trainee, trainer, and training design. The learner



develops skills and reasoning over time in a cyclical and structured process of interaction with peers, practice, coaching, receipt of meaningful feedback, and reflection (Jessee, 2018). Moreover, the process of learning and training is embedded within and influenced by the sociocultural context. In the field of dysphagia, an increasing level of complexity required in VFSS analysis has increased the necessary level of support, discussion, practice, and reflection and has thus extended the time required of trainers and trainees.

### **Trainee**

The development of competency takes time and practice, and trainees appear to proceed through training at different rates. Our participants' observation that some trainees may have initial advantages with regards to interest and previous clinical or academic experience is consistent with contemporary theories of clinical reasoning (Jessee, 2018). Trainees were also perceived to differ with regards to their cognitive attributes, such as flexibility, the ability to synthesise and integrate information, and their visual skill.

While the trainers in this study suggested personal influences in training, these influences remain untested. Verification of the influence of experience and cognitive attributes on training and skill development would be helpful for future training development. It may be beneficial to ensure a base level of knowledge of anatomy and physiology prior to entering VFSS training should previous academic attainment influence success and speed in training. If specific cognitive or visual skills influence success in training, then some clinicians may benefit from more specific reflection on their experience with practice over different cases, while others may benefit from building visual skills, facilitated by meaningful feedback from a mentor, to further build their cognitive repertoire (Jessee, 2018).

Trainees were also perceived to differ in their approach to learning. The trainers described trainees as preferring to attend to detail over the gestalt, being driven by hypothesis, or adopting a problem-solving approach. Trainees may benefit from metacognitive reflection on the strengths and areas to improve with regards to their approach to a skill or case (Jessee, 2018).

Confidence was generally perceived as a positive attribute in training. Trainers sought to preserve and develop confidence throughout training. In contrast, over-confidence was suggested to hinder the ability to deal with the unexpected. Self-efficacy, a person's belief that they can learn and attain a skill set or an ability to perform, has been positively related to outcomes in education (Talsma, Schüz, & Norris, 2019). However, in the higher education setting, there can

be a mismatch between self-efficacy and achievement: high-achieving students underestimate their ability to succeed, and, conversely, low achievers are overconfident in their ability (Burgess, van Diggele, Roberts, & Mellis, 2020; Guntern, Korpershoek, & van der Werf, 2017). Our participants' observations suggest feedback is essential in training to help the learner realistically evaluate their abilities. Discussion with a trainer (or peers) after completing a task enables a learner to see where the gap is between their current performance and the goal. Once the learner then attempts the task again with feedback, they can determine whether they are closer to the target, and evaluate the success (or otherwise) of their learning strategy (Burgess et al., 2020). In this way, the learner uses this feedback as part of their own internal assessment of their progression towards competence.

Despite these differences, with time and practice, competency to the satisfaction of the trainer and organisation was achieved. Understanding the difference between trainees and meeting their individual learning needs may result in more effective investment of training time.

### **Trainer**

The participants in this study described their role in a way that was akin to the 'facilitator of learning' described by Knowles, Holton, and Swanson (2005). Rather than teaching or transmitting information, the trainers coached the trainees, managed the process, and were a resource for the learner (Jessee, 2018).

Our participants highlighted the need to carefully structure exposure to challenge and complexity, while at the same time ensuring that the trainee maintained sufficient confidence. The participants in this study discussed building this confidence by offering a graded approach in which the learner experienced early success while being able to see the skill performed by the mentor, then encouraging the learner while extending the complexity of the task. This process of feedback resulted in competent analysts.

Each trainer worked in a unique setting and contributed to training their own expectations of 'competence', which would likely influence both the perceived pressure on trainees as well as the investment of time required in training. Introductory training and skill assessment prior to entering the period of mentoring and training in the clinic may increase the confidence in analytical development and reduce the burden on trainers. Completion of the MBSImP online training and independent practice in the acquisition of the skill of quantitative measurements are two possible ways to reduce the load on trainers, as learners can independently develop and self-assess skills

that are defined, evidence-based, and measurable (Martin-Harris et al., 2008; Nordin, Miles, & Allen, 2017).

### Training environment

VFSS analytical trainees expand their learning into the VFSS clinic itself (both in the administrative areas and radiology suite) and actively participate with gradual withdrawal of support until competency is achieved.

Identifying learners for whom the environment is a barrier may enable these learners to develop VFSS analytical skill. The medical training literature suggests that enjoyment in training and success in the first year are positively associated with self-efficacy (Talsma et al., 2019) and McBride found that self-efficacy increased in a cohort of graduate speech pathology students across the course of their training (McBride, 2022). The participants in this study identified that not all learners enjoy the VFSS suite, as it is fast paced and stressful. Self-efficacy is influenced by how a learner interprets their physiological state (Bandura, 1997). If a learner finds the VFSS suite stressful, they may interpret that as a sign that they will not succeed; in contrast, a person who finds the environment stimulating may interpret that as a sign that they will succeed (Bandura, 1997). It is possible that some learners may benefit from refining analytical skills outside of the VFSS suite prior to learning how to direct studies. This could reduce the cognitive load when they do begin to work online in the VFSS suite. Alternatively, some learners may benefit from strategies and encouragement to manage their reaction to the pressure in the environment (such as the workshop described by Cardell & Bialocerkowski, 2019). Self-efficacy is an asset which may allow the learner to deal with difficult situations and to constructively reflect on the experience afterwards (Cardell & Bialocerkowski, 2019). In some facilities, it is possible that the environment may be able to be adjusted to facilitate learning, for example ensuring that new learners are paired with experienced and supportive radiology and radiography colleagues.

In smaller facilities, intensity of practice and the opportunity for feedback were limited by case numbers. Online packages, such as that described by Taubert et al. (2021), may provide a method for enhancing practice opportunities with feedback. Telehealth is another potential way to provide high fidelity experience in the VFSS suite for trainees in places with fewer clinical opportunities. Burns, Ward, Hill, Phillips, and Porter (2016) have demonstrated the feasibility of real-time telepractice VFSS. The technology could be used similarly to link a training clinician to a busier VFSS suite to increase practice opportunities. In the interim, preparation work could be as simple as encouraging novice clinicians to review historical cases, prepare their analysis and recommendations,

and compare their work with the report that was generated at the time.

### Complexity

The management of dysphagia has changed with new information, such as the impact of sensory deficits, respiratory conditions, aging, and interruption to the central control on swallowing (Clayton, Carnaby, Peters, & Ing, 2014; Daniels, Huckabee, & Gozdzikowska, 2019; Huckabee & Lamvik-Gozdzikowska, 2018). Clinicians are responding and adapting to new research suggesting that rehabilitation should consider not only force but also timing and relative amplitude, and therefore the right intervention should be prescribed according to differing impairments such as weakness, spasticity, apraxia, respiratory disturbance, or sensory change (Clayton et al., 2014; Huckabee & Lamvik-Gozdzikowska, 2018). VFSS has evolved to become a sophisticated synthesis of theory and the person's medical history, with accurate analysis of the biomechanics able to be observed. Our participants' description of increasing complexity in training is consistent with the increase of the knowledge base and its consequences for assessment and intervention. With this increase in complexity, perhaps it is now time to review the methods used to train analysts to accommodate this expanded skill and knowledge set.

Our participants discussed the trajectory from clinical skill acquisition to the visual detection of signs of swallowing dysfunction on screen and finally to decision making and report writing. The development of this competency takes time and careful planning. VFSS training packages and competency programmes are being developed to meet this need, but without rigorous evaluation of the outcomes of training as it happens in the clinical setting (Edwards, Froude, & Sharpe, 2018). Our participants identified a potential for enhancing training and making it more efficient. Hybrid methodologies that include group interaction, mentorship, online and independent study, and formal professional development events may have their individual benefits and place in the development of clinicians (Taubert et al., 2021). Well-designed Phase I research is required to inform the design of high-quality larger-scale studies to assess the relative benefits of training approaches.

Our finding that a mentorship model was the typical model amongst our participants in hospitals was consistent with reports from Australian managers in Taubert et al.'s (2021) study. The investment of time associated with mentorship was a consistent thread throughout our participants' reflections on this method of training. Resource-intensive training of VFSS analysts occurs in systems that are equally demanding of efficiencies, judicious use of resources, and competency. A key disadvantage to mentorship

is the difficulty of access to training for remote clinicians, for which online methods may provide a partial solution (Taubert et al., 2021). Quality evidence is required to inform the development of accessible and standardised training packages.

### Methods

Approaches to thematic analysis exist along a continuum from predominantly qualitative to predominantly quantitative. This study's design approaches the quantitative end of this spectrum and could be described as a codebook approach (Braun et al., 2019). A systematic review of the available literature (Edwards et al., 2021) suggested that the learner's own characteristics and the learning environment may influence the development of VFSS analytical ability. The intention of this study was to provide more detail about these influences. We assumed these were the known unknowns (to paraphrase Donald Rumsfeld), and that unknown unknowns may also be present (Logan, 2009). Inductive coding of the data allowed for the participants' experience to drive the thematic development beyond simple classification into domains according to our expectations and allowed the themes and interrelationship between domains relating to the investment of time and the experience of increasing complexity to be consequently revealed. This research design was deliberately structured to obtain the benefits of a deductive approach while simultaneously remaining responsive to patterns that emerged from our participants' experiences.

### Limitations

Despite a widespread attempt at targeted international recruitment of countries with English-speaking VFSS analysts, our participants were recruited from three countries only. These findings may not generalise as readily to different health contexts. The number of participants was small, and while useful themes emerged, a larger sample may have identified other influences in VFSS analytical competency development. This study investigated the trainer's view alone; future research should explore the perspective of trainees.

### Conclusion

This study described the trainer's perspective of the factors that influence VFSS training in the workplace. The trainers identified that the learner brings personal characteristics and clinical experience to the training environment, and that the trainer, training method, and system also influence a person's trajectory to competence. VFSS trainers are preparing trainees to

analyse in an increasingly complex field, as the evidence base and practice patterns for dysphagia continue to expand and develop.

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