Virtual humans serve as role players in social skills training environments simulating situational face-to-face conversations. Previous research indicates that virtual humans in instructional roles can increase a learner’s engagement and motivation towards the training. Left unaddressed is if the learner is looking at the virtual human as one would in a human-to-human, face-to-face interaction. Using a modified version of the Emergent Leader Immersive Training Environment (ELITE-Lite), this study tracks visual attention and other behavior of 120 counselor-trainees counseling a virtual human role-playing counselee. Specific study elements include: (1) the counselor’s level of visual attention toward the virtual counselee; (2) how changes to the counselor’s viewpoint may influence the counselor’s visual focus; and (3) how levels of the virtual human’s behavior may influence the counselor’s visual focus. Secondary considerations include aspects of learner performance, acceptance of the virtual human, and impacts of age and rank. Result highlights indicate that counselor visual attentional behavior could be separated into two phases: when the virtual human was speaking and when not speaking. When the virtual human is speaking, the counselor’s primary visual attention is on the counselee, but is also split toward pre-scripted responses required for the training session. During the non-speaking phase, the counselor’s visual focus was on pre-scripted responses required for training. Some of the other findings included that participants did not consider this to be like a conversation with a human, but they indicated acceptance of the virtual human as a partner with the training environment and they considered the simulation to be a useful experience. Additionally, the research indicates behavior may differ due to age or rank. Future study and design considerations for enhancements to social skills training environments are provided.