Exploring Facilitated Debriefing Techniques Using a Diary Study

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Diary studies, when used as a qualitative research instrument, provide numerous advantages not possible with other methods. These differences become even more apparent when comparing diary study results to the vastly different quantitative type paradigms. Although less commonly used, their unique benefit to the researcher is both the volume and nature of the open-ended data captured. This underutilized method offers the researcher an opportunity to discover a rich first person account of the experiences, feelings, observations, and solutions to challenges. Here we present the beginning of a research study where we employed a diary study method to discover specific behaviours and observations from the perspective of aircraft simulator instructors. Specifically, during the post-simulator debriefing we examined first-person insights on how simulator instructors utilize facilitated debriefing techniques in addition to both the recognition and mitigations to learning barriers.

Understanding human behavior in natural settings offers both challenges and benefits simultaneously. For example, external factors can intrude unpredictably into your observations and can be both problematic and insightful as to how work is performed in complex environments. Traditionally, early in the study design process, researchers have a general idea if their methods could be categorized as either qualitative or quantitative in nature. Additionally, a researcher's field of study may also help with this categorization. Unfortunately, the social sciences have previously struggled with claims that, typically, qualitative methods in general lack the ability to find the provable "truth" or statistically supported findings. Historically, this claim has positioned the social sciences on the defensive, resulting in a consuming focus on trying to legitimize their research by following the lead of the more quantitative physical science research paradigms. Here we choose to not focus on language that invites argumentative discourse as this oration has gone on long enough and the arguments' relative merits are thoroughly contrasted elsewhere (Kunh, 1962; Flyvbjerg, 2001; Blaxter, Hughes, & Tight, 2006).

The question remains, how do we decide what methods of data collection are best for natural settings where work is complex, messy, and frequently does not follow a predictable script? Woods (1992) lends some insight by stating that in complex and dynamic systems we "must use a different subject population than the typical subject of psychology experiments." These environments include, but are not limited to, aircraft cockpits, nuclear power control rooms, and various health care settings. The nature of the study we describe here lends itself to one where we take a more holistic approach to sampling data from the context of real work as done. Described in the literature by Hutchins (1995a) as "cognition in the wild", this approach

reminds us to be cautious as to not disturb the work process since this has the very real potential to truncate or alter our ability to understand work in context (Bartlett, 1932; Hollnagel & Woods, 2005; Hollnagel, Woods, & Leveson, 2007; Hollnagel et al., 2008; Hollnagel et al., 2009; Dekker, 2016; Hollnagel, 2017).

Diary Study

Here, we describe how we are employing a diary study method of data collection for research examining how professional simulator instructors discover and mitigate challenges to post-simulator facilitated debriefings. Diaries, in either the written or audio format, are self-reported instruments used to examine specific experiences. Diary studies in particular offer researchers the opportunity to investigate social, psychological, and physiological processes, with events that can be unpredictable (Bolger et al., 2003). Effectively, this underutilized research method offers us an opportunity to study cognition in natural settings from a more observational perspective. That is, to capture a very rich first person account of the experiences, feelings, observations and solutions to problems.

A researcher's specific research goals and questions will dictate if a diary study will be a good choice as a research tool. For example, when considering your research goals, a more open-ended examination of contextually rich environments lend themselves well to employing a diary method. In general, three broad types of research goals are possible using diary designs: (a) obtaining reliable person-level information; (b) obtaining estimates of within-person change over time, as well as individual differences in such change; and, (c) conducting a causal analysis of within-person changes and individual differences in these changes (Bolger et al., 2003). These are not trivial considerations as the methods and questions chosen for data collection will effect both the nature of your results and how they are interpreted (Bolger, et al., 2003). For the study we describe here, we are gathering reliable person-level information since we are amassing descriptions of specific events identified ahead of time (post-simulator debriefing) for each of the simulator instructors. These descriptions are not compared against each other but rather collected and analyzed as aggregate data.

Diary studies, when used as an ethnographic research instrument, provide numerous advantages not possible with other methods. Additionally, they can also support a more grounded theory approach—that is, one which is more exploratory in nature and later may reveal a potential hypothesis. The freedom provided by a diary study includes the ability of a researcher to explore the data and understand the unique complexities of work from different perspectives. These differences become even more apparent when comparing diary study results to the vastly different quantitative-type paradigms and their focus on a specific hypothesis and statistical justification. Other known benefits to the research community, diary studies offer unique research benefits. Some of these include both the volume and potential depth of the open-ended data captured which is simply not possible with other more rigid study design constructs. This rich contextual pool of data is possible by the unique flexibility and characterization of a diary study design.

Although diary studies provide the researcher a plethora of contextual rich data to examine, like any other research instrument, there are limitations and challenges unique to each.

For example, diary studies can suffer from being too tedious for the subject and they can invoke a "Heisenberg-style" challenge: that is, the process of influencing the observations by intruding upon and interfering with the very flow of the events being examined (Czerwinski et al., 2004). In the study presented here, we addressed each of these by providing recording pens so that they can verbally report their discussion as opposed to the more laborious task of writing out the details of their experience. As for the "Heisenberg-style" consideration, we addressed this by having the instructors make their recordings right after the post-simulator debriefing. This has the additional benefit of helping to prevent or at least reduce any memory recall problems with those that are captured later.

Facilitated Debriefings

Many safety-sensitive domains utilize advanced forms of simulation to capture learning objectives for both initial and recurrent training programs. Research has shown that these simulator sessions are more meaningful when followed by a structured debriefing session (Helmreich & Foushee, 1993). Precision flying skills are considered by many as easier to evaluate since they are based on specific quantitative flight parameters (i.e., airspeed ± 10 kts.). Instructors can easily debrief these training aspects as the performance is evaluated as being either within the allowable range or not.

Teamwork and collaborative constructs are much harder to evaluate for both the students and instructors as these events unfold due to either the more subjective nature of how these terms are defined or the lack of a measurable quantity. The evaluation of these collaborative teamwork constructs requires a more effortful discourse where students are the central focus. Post-simulator debriefings are more meaningful when conducted in a facilitated manner—that is, where the students through self-discovery discuss their non-technical performance (e.g., flight deck communication and collaboration), and as a team review the training event to discover areas of both strengths and weaknesses. If the debriefing is conducted correctly, the students will be able to better take their perspective of their performance back to the real aircraft and with reflection make changes to their day-to-day flying and collaborative abilities. Adult learning literature also suggests improvements in day-to-day performance is where a student-centered approach will lead to deeper understanding, better memory retention and later skill application (Duval & Wicklund, 1972; Gow & Kember, 1993; Jones, 1982; Dismukes, Jobe, & McDonald, 1997).

Although the adult learning literature discusses why facilitation is beneficial to promote a deeper understanding of the material and increased retention, there is limited guidance as how to conduct a facilitated debriefing. In other words, what are the essential components of these sessions, and how should they be conducted? Furthermore, there appears to not be, or at least not published, a serious research attempt to capture as many barriers to learning discovered in a simulator-training environment using ethnographic techniques. Even less available is guidance addressing any of these barriers and more importantly the successful strategies used to overcome obstacles to learning. Our research study presented in part here addresses these absences and the diary study method gives us the freedom to capture rich contextual data.

Data Collection

This study will utilize a group of professional simulator instructors who will conduct facilitated debriefings once we complete a literature review, subject matter expert (SME) consultation and standardized pre-study training. When the study begins, they will first answer four predetermined questions that are specific to facilitation methods and encountered barriers to learning. After these are addressed, they are encouraged to share all thoughts on the experience regardless of how pedestrian they may seem. The goal of this study, which is why the diary method is particularly effective, is that it offers subjects many degrees of freedom in both how and what they chose to report.

However, prior to data collection, literature searches for facilitation barriers to learning and previous aerospace research on debriefing facilitation was reviewed to see how this line of research could be further explored. Once completed, we met several times with subject matter experts (SME) that are simulator instructors and training captains who were able to provide significant insight into post-simulator debriefing challenges, in addition to how, in their experience they have seen facilitation both work successfully and fail. Thus, they were able to help us craft definitions of what facilitation means in this application and how that connects to the last of the aerospace research from the late 1990s (Dismukes et al., 1997). We were also fortunate to speak with the foremost NASA researcher who led this effort during that time.

All of these perspectives allowed us to establish several foundational components to our study: a) we developed a solid understanding of what facilitation is and what it is not, b) we established challenges and benefits commonly experienced (including known barriers to learning in the debriefing environment) by SMEs who use facilitation methods regularly (weekly basis) and, c) established the specific questions that we required instructors to include in their diary entries (see below). Once answers to these questions were established and prior to data collection, we provided a “standardization” class for the instructors. This class was used to ensure that they understood the meaning and goals of the study, their individual responsibilities, and satisfying Institutional Review Board (IRB) protocols. Materials covered included answers to what the SMEs felt was effective facilitation, operation of the recording pen, downloading and submitting their diary audio files, and a discussion on what a diary study is including history, advantages/disadvantages, and how to specifically make an audio diary entry. The specific required diary entry was initially structured around four questions that as a group with the help of the SMEs and the previous literature search we felt should be addressed in each diary entry. The questions are:

1. Over all, how well did the facilitation attempt work? Offer a high-level perspective of the experience as a whole.
2. What were the indications noticed that the crew arrived ready for self-discovery, or not?
3. What were the barriers to facilitation that you noticed? How were you able to discover them?
4. Were there any mitigation strategies attempted to any of the barriers experienced? If so, what were they and how well did they work? What would you do differently in other training events?

Otherwise, as part of diary study methods, instructors had free rein to discuss their observations, concerns, successes and failures while trying to conduct facilitated debriefings.

This type of study design would normally imply a retrospective analysis (the subject completes their diary entry once after the debriefing) complete with all of its biases and limitations. However, from a timing consideration this approach was our only opportunity for data collection since the instructors were not allowed to make their diary entries during the actual debriefing as requested by management. We agreed with their concern to the potential disruptive nature of trying to capture this data from the debriefing in real time. Some researchers would argue that this delayed capture may seem to shift the timing of the data collection from a prospective to a retrospective format. However, despite this apparent challenge, we felt that our data collection is actually far more prospective then many would appreciate. The instructors were guided to make their diary entries immediately after the post-simulator debriefing. This immediate entry would reduce biases and memory challenges, and we would be capitalizing on the learning principles of primacy and recency to significantly reduce the extent of retrospection bias and memory challenges (Bolger, et al., 2003). We felt that this approach was a reasonable balance between usual diary study methods and real world constraints and trade-offs that make this operational space challenging. We realized that there would be times when making the diary entry immediately after was not possible (for example during the middle of night while fatigued or when personal schedules are prohibitive). In those cases, the instructors were advised to make the diary entry as soon as practicable.

Conclusions

By using an ethnographic type research design (diary study), we were able to discover specific behaviors and observations from the first person prospective view from simulator instructors. For this specific work context, they are the best source of information which supports our understanding of both their challenges and opportunities when conducting facilitated debriefings. By our design, the simulator instructors offered truly a first person perspective that is captured in a prospective manner. This first perspective or first story has high ecological value because these experiences are carried out *in situ* or in the users' real environment (Czerwinski et al., 2004). In our research discussed here, using a diary study method allowed us insight to a contextual process that has not been previously explored and captured. This approach provided a much deeper and richer understanding of the challenges professional simulator instructors face. In our case, no other research instrument would have provided the balance between a comparatively less rigid method while yet still offering rich contextual data that will drive the next phase of our research on improving and standardizing the facilitating debriefing process.

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