

Do Effective After-Action Reviews Lead to Better Performance?

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Abstract

After-action reviews (AARs) are meetings in which teams meet to recall, analyze, and set goals according to previous performance. Strong evidence indicates that the use of AARs can enhance performance (Tannenbaum, Cerasoli, 2013; LePine, Piccolo, Jackson, Mathieu, Saul, 2008). However, these studies do not examine the relationship between quality of AAR performance and team task performance. The present study utilizes 25 teams operating a simulated airline and examines the relationship between performance during the AAR and both subsequent and previous task performance. The NASA Flight Operations Center – Unified Simulation (FOCUS) lab at Middle Tennessee State University emulates a high-fidelity flight operations center where team members work together to operate a virtual airline. Each team participates in three simulations of which progressively increase in difficulty. AARs take place between simulations, allowing for teams to make meaning of their past performance, create goals accordingly, and ultimately improve. The purpose of this research is to analyze the relationship between AAR effectiveness and simulation performance of teams. Correlations did not reveal significant relationships between AAR performance and task performance. Suggestions for further research are discussed including utilizing a measure of adaptation rather than the current task performance measure which reflects routine performance.

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Marks, Mathieu, & Zaccaro (2001) developed a temporal model of team performance that involves both action and transition phases. During action phases the team is actively involved in its focal task(s). During transition phases, teams engage in planning and assessment activities. Marks and colleagues envision team performance over time as alternating periods of transition and action processes. Effective transition phase activities such as assessment and planning can facilitate performance during the action phase.

One procedure that can be used during transition phases is after-action reviews (AARs). AARs are team meetings intended to encourage experiential learning. These meetings are a systematic approach for teams to discuss past performance, interpret the results, and create goals based on these interpretations. Comprehensive meta-analyses have shown that the use of AARs leads to improved team effectiveness (LePine, et. al. 2008; Tannenbaum and Cerasoli,2013). Although these studies did not examine the effectiveness of AAR performance, they suggest that effective AAR performance may lead to improved task performance.

Conversely, previous task performance may relate to subsequent AAR performance (Matsui, Kakuyama, Onglatco, 1987; Bell, 2007). This is illustrated by the control systems model of task feedback which demonstrates that discrepancies between team goals and actual performance will be minimized by the team, motivating improvement, and thereby increasing team efficacy during AARs (Powers, 1973). That is, teams that fail to perform up to standard, may be more motivated to improve subsequent performance. Active involvement in AARs are a mechanism by which teams

can seek to improve action phase performance. Teams that perform poorly during an action phase segment may be more motivated to use the subsequent AAR to plan for improved performance.

The current study examined the relationship between effective after-action reviews and team performance. We postulated the following:

H₁: After-action review performance will correlate with subsequent improvements in task performance.

H₂: Low levels of preceding task performance will correlate with high levels of subsequent after-action review performance.

Methods

Participants

The NASA Flight Operations Center Unified Simulation (FOCUS) Lab is composed of approximately 10-person teams of senior aerospace students of various disciplines (e.g. weather, pilot, coordinator, maintenance) collaborating in team-oriented tasks during three high-fidelity flight simulations. Twenty-three teams participated in a series of three simulations with each simulation increasing in difficulty. Teams met for AARs following each simulation. These meetings were designed for teams to reflect, interpret, and set goals according to past performance in an effort to improve performance in the simulation that follows. A research faculty member acts as facilitator in AARs in order to guide the meetings and rate the effectiveness of each team in their ability to analyze performance and specify goals.

Measures

After-Action Review Performance. Three dimensions are measured in rating AAR performance. The criteria follow Marks' taxonomy of transition phase processes:

1. Mission Analysis: Elucidation and evaluation of team's tasks, environmental conditions, and available resources
2. Goal Specification: Identification and prioritization of team goals
3. Strategy Formulation and Planning: Creating contingency plans or alternative solutions to potential changes in environment.

Task Performance. Delay loss is the revenue loss per minute due to failure to release flights by a scheduled time. We chose delay loss as an appropriate representation of task performance as it is easily measured to show improvement in teams. Within an AAR, delay loss is discussed and assessed by teams for goal setting according to their performance. The change in delay loss from simulation two to simulation three was therefore our assessment of improvement in performance.

Procedure

AAR performance and task performance were compared across teams ($N = 23$ teams). Performance in AARs were measured by averaging the ratings of two facilitators. Task performance was represented by delay loss. We calculated the difference of delay loss from simulation two to simulation three to represent the change of task performance per team (improvement). A correlational analysis was then computed for AAR performance against change in task performance for each team. A second correlational analysis was computed for task performance from simulation two as it relates to task performance in simulation three.

Results

The correlation between AAR performance and task performance was not significant, $r(21) = -0.139, p < .01$. Nor was the correlation between previous task performance and subsequent AAR performance significant, $r(21) = -0.187, p < .01$.

Correlations

		AAR Performance (Sim 2)	Change in Delay Loss	Sim 2 Delay Loss	Sim 3 Delay Loss
Facilitator Rating: AVG Sim 2	Pearson Correlation	1	-.139	-.187	.034
	Sig. (2-tailed)		.547	.416	.888
	N	21	21	21	20
Change in Delay Loss	Pearson Correlation	-.139	1	.764**	-.667**
	Sig. (2-tailed)	.547		.000	.001
	N	21	23	23	21
Delay Loss Sim 2	Pearson Correlation	-.187	.764**	1	-.169
	Sig. (2-tailed)	.416	.000		.465
	N	21	23	23	21
Delay Loss Sim 3	Pearson Correlation	.034	-.667**	-.169	1
	Sig. (2-tailed)	.888	.001	.465	
	N	20	21	21	21

Figure 1. ** Correlation is significant at the 0.01 level (2-tailed).

Descriptive Statistics

	Mean	Std. Deviation	N
AAR Performance (Sim 2)	3.5905	.54028	21
Change in Delay Loss	7596.7765	18253.83926	23
Sim 2 Delay Loss	36174.7713	11423.32239	23
Sim 3 Delay Loss	31299.7086	8368.68994	21

Figure 2.

Discussion

These findings are not supported by relevant research. Potential limitations with this study may include the variables we chose to examine. AARs focus on task improvement and may be expected to have a more substantial impact on a measure of performance such as trigger effectiveness (non-routine situations requiring adaptation).

We also chose to only measure improvement between simulation two and simulation three. It is possible that the greatest impact of AARs takes place in the change from simulation one to simulation two. Sufficient data was not available to conduct a correlational analysis on interrater reliability. As such, we could not determine if variability between facilitator ratings of AAR performance affected the results. These results may suggest ambiguity in the effects of AARs on team performance.

Alternatively, the reliability of our two-rater system in the rating of teams' AAR effectiveness may have limited our findings. Future research may examine alternative measures of performance as well as include a deeper exploration of the mechanisms of AAR transition performance ratings.

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