Electronic Performance Monitoring and Stress: The Role of Feedback and Goal Setting

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1. Introduction: Electronic Performance Monitoring

Performance monitoring refers to supervisors' gathering of information about the work effectiveness of employees. It is an integral part of effective management because it enables management to keep track of employees' productivity level. Performance monitoring is important for two reasons. First, it serves as a basis for other important management actions. For example, based on monitoring information, supervisors are able to provide feedback to employees, diagnose performance problems, reward good performers and set goals for future performance (Grant, Higgins, & Irving, 1988; Sherizen, 1986). Performance monitoring also affects employee behavior in that it often functions as a social cue of management intent, signaling employees as to which work activities are more important and which are not. As a result, employees are more likely to focus on those activities that are monitored (Larson & Callahan, 1990). Field studies have found that effective managers often engage in more frequent monitoring activities than ineffective ones (Komaki, 1986).

Technological developments have brought about numerous changes in the manner in which managers do their jobs. Performance monitoring is no exception. Electronic work monitoring refers to the computerized collection of employee performance information. Electronic monitoring has become popular largely due to the rapid computerization of the modern workplace and development of computer network technology. With the proper software, managers now are able to unobtrusively determine each individual employee's work pace, performance accuracy and the amount of time spent on work or non-work related activities. According to an estimation by the Office of Technology Assessment, in 1987 there were six million American workers whose work was monitored and evaluated by electronic monitoring systems (U.S. Congress, Office of Technology Assessment, 1987). By 1990, the number increased to over ten million employees nationwide (9 to 5, 1990).

Computer monitoring differs from traditional monitoring in the scope and content of the monitoring. In traditional performance monitoring, managers were only able to spend a small amount of their time engaging in monitoring activities. Computer monitoring, however, is capable of recording employee activities in a continuous fashion. Even though managers may not spend all of their time sitting in front of a computer terminal watching employees working, to the monitored employees monitoring is taking place constantly. While the focus of traditional monitoring was on productivity or employees' work product, the new capacity of electronic monitoring has changed this to include a focus on the work process and even non-work activities (e.g., bathroom breaks). These two differences have made computer monitoring different from traditional monitoring in a fundamental way.

Computer monitoring has bee a controversial issue since the day it was introduced (cf. Aiello, 1993). Management and labor have typically been on opposite sides of the debate.

associated with increased stress. In studies 2, 3 and 4, subjects under the computer monitored conditions reported significantly higher levels of stress compared to those who were not monitored. In study 5, we manipulated feedback (positive or negative feedback, group or individual feedback) in conjunction with computer monitoring. Data showed that regardless of the kind of feedback subjects received, subjects who were electronically monitored felt more pressure from the supervisor than those who were not monitored.

The results of study 1 and study 6 showed some interesting moderating effects of other individual and organizational variables on the monitoring/stress relationship. In study 1, we measured subjects' locus of control and found that subjects who were more external in their locus of control (that is, individuals who believe that reinforcements they receive are primarily determined by factors outside of themselves) reported higher levels of stress under the monitoring conditions. Thus, we are reminded that there are individual differences in responses to computer monitoring. This study also demonstrated that perceptions of control over monitoring affect the degree to which stress is experienced. When monitoring occurs at the individual level, it leads to higher stress than when monitoring is performed at the group level. Results of study 6 (as in study 4) supported this pattern of results. In both studies, subjects who were individually monitored felt the most pressure, while those who were monitored at a group level reported less stress.

These results are consistent with the findings reported by researchers using different measures of stress and in different settings. For example, Schleifer and his colleagues used physiological measures of mood and found that computer monitoring caused mood disturbances and musculoskeletal discomfort among those who were working on a VDT data entry task (Schleifer, Galinsky & Pan, 1992). In a field study, Smith and his associates surveyed telecommunications workers and found that monitoring was associated with high levels of tension, anxiety, depression, anger and fatigue (Smith, Carayon, Rogers & LeGrande, 1990).

We also examined subjects' reactions toward the task and their supervisor under different monitoring conditions. Two of our studies (studies 3 & 4) reported that subjects exposed to computer monitoring expressed a more negative view toward their supervisor and the task.

3. Effects of computer monitoring on task performance

While the relationship between computer monitoring and stress is relatively clear, the association between monitoring and task performance is less well-established. Despite the belief by many computer monitoring advocates that monitoring will improve worker productivity, the results from our studies are mixed. We have found that the effects of computer monitoring on task performance are strongly affected by the nature of the task, especially task complexity. In general, when the task is simple and repetitive, e.g., data entry, computer monitoring improves performance level. If the task is the least bit complex (i.e., requires much thought), computer monitoring lowers performance level. This pattern is clearly evident in four of our studies. For example, in two of the studies (studies 4 & 5) using a simple data entry task, computer monitoring led to enhanced performance. In contrast, in the two studies that used a complex anagram task (studies 1 & 3), computer monitoring led to lower levels of performance.

The differential effects of computer monitoring on simple vs. complex task performance can best be explained using a social facilitation framework. Social facilitation posits that in the presence of an audience or coactors, complex task performance will decline and simple task performance will improve (Zajonc, 1965). Our work has demonstrated that computer monitoring establishes a situation in which there is a constant remote audience, which

5. Conclusion

Computer monitoring has been a controversial issue because of the distinct advantages and disadvantages associated with it. On the positive side, it can provide immediate and objective performance feedback, facilitate goal setting and lead to productivity gains. On the negative side, computer monitoring is often perceived as an invasion of privacy and as an excessive management control tool. It can lead to increased stress and lower job satisfaction among monitored workers.

Findings of the six studies reported here demonstrated that computer monitoring is clearly associated with higher stress levels. Its effects on productivity however, are strongly affected by the complexity of the monitored task; monitoring facilitates simple task performance and impairs complex task performance. Computer monitoring with feedback does not appear to be sufficient for performance gains; goal setting must also be introduced to produce significant performance improvements.

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Table 1. Summary of Six Computer Monitoring Studies

Study	N	Task	Effect on Stress	Effect on Performance
1. Aiello & Svec	72	(c) anagram	Externals experienced more anxiety under CM	CM lowered task performance
2. Aiello & Shao(A)	224	(s) find the vowel	CM led to higher stress level	CM improved perf. in negative climate; CM plus FB and Goal improved performance
3. Aiello & Shao(B)	232	(c) anagram	CM led to higher stress level	CM lowered task performance; CM plus FB and Goal improved performance
4. Aiello, Shao, Chomiak, & Kolb	130	(s) data entry	CM led to higher stress	CM improved task performance
5. Aiello, DeNisi, Kirkhoff, Shao, Lund & Chomiak	213	(s) data entry	Monitored subjects reported more pressure	CM(without FB) led to highest perf.; CM (with FB) led to intermediate perf.; No CM (& No FB) led to lowest performance.
6. Aiello, Kolb, & Wollering	202	(s) data entry	Individually monitored subjects felt most pressure	Perf. was best among those who were individually monitored and part of a cohesive work group

Note: CM = Computer Monitoring; FB = Feedback; (c) = Complex Task; (s) = Simple Task; Perf. = Performance.