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ABSTRACT

This document contains three papers from a symposium on team-based work in human resource development (HRD). "Toward Transformational Learning in Organizations: Effects of Model-II Governing Variables on Perceived Learning in Teams" (Blair K. Carruth) summarizes a study that indicated that, regardless of which Model-II variable (valid information, free and informed choice, or internal commitment) is introduced, perceptions of team learning may depend on interaction between gender and employment status and, possibly, interaction between gender and education level. "Training for Team-Based Work: A Study on the Relation between the Organization of Teamwork and Team Training" (Rob F. Poell, Ferd J. van der Krogt, Ad A. Vermulst) reports on a comparative case study of team-based learning at 27 industrial and service-sector organizations that established that self-directed teams did not provide a better, or even different, training context to their members than other teams did. "Collaboration in a Virtual Team Environment: A Case Study in Planning the ASTD/AHRD (American Society of Training and Development/Academy of Human Resource Development) 2001 Future Search Conference" (Gary L. May, Teresa J. Carter, Jennifer D. Dewey) discusses a case study that suggested that pre-existing relationships establish trust in virtual environments and the virtual environment's workload according to individual talents and interests. All three papers include substantial bibliographies. (MN)

2002 AHRD Conference

Team Based Work

Symposium 25

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Toward Transformational Learning in Organizations: Effects of Model-II Governing Variables on Perceived Learning in Teams

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This study examined the effects of Model-II variables on perceived team learning by intervening the variables into three experimental groups. For two variables, perceived team learning was significantly lower than the control group. However, additional analysis revealed that the main effects were uncertain; regardless of which Model-II variable was introduced, perceptions of team learning may have depended on an interaction between gender and employment status and by a possible interaction between gender and education level.

Keywords: Model-II, Double-loop, Transformational

The study of learning organizations is a growing line of inquiry that has been approached from a number of disciplines and perspectives. With the decline of the industrial economy, organizations, profit and non-profit, representing all industries must seek to find and develop organizational members who have learned how to learn and who can work with other organizational members to enact systemic organizational change at an increasingly rapid pace.

It behooves organizations to understand the dynamics behind team and organizational learning so they may capitalize on interventions that produce desired learning impact. Model-II is a theory postulated by Argyris and Schön (1978, 1996) that describes conditions upon which deep-rooted or transformational learning within organizations may take place. The model presents three governing variables: (a) valid information, (b) free and informed choice, and (c) internal commitment. Numerous studies have been performed to examine this model, mostly utilizing qualitative in-field methodologies. However, post intervention studies failed to provide evidence of sustained learning (Argyris and Schön, 1996), rendering use of the model problematic. Argyris and Schön suggested a need exists to develop studies that utilize design methods that examine Model-II from perspectives different from those used in the past.

Quantitative research using experimental design methodologies is now emerging as a strategy to examine the model. Recent quantitative studies have shown evidence of transformational learning when Model-II interventions were employed (Kardatzke, 1996; Jeris, 1997; Ritchie, 1999). While these studies have made contributions to the Model-II line of inquiry, they examined the model holistically leaving one to question which parts of the model may have more impact on organizational learning.

The primary purpose of this study sought to identify the effects of each Model-II governing variable on perceived team learning. A secondary purpose of this study sought to contribute results that might be compared to future studies to either increase or decrease acceptance and subsequent use of Model-II by providing indication of the model's impact on organizational learning.

Theoretical Framework

Argyris and Schön (1978, 1996), Argyris (1998), Marsick (1988), and Schön (1983), discussed the need for inquiry that leads to transformational change in organizations. Argyris and Schön and Argyris differentiated between single-loop learning and double-loop learning which may be compared to the difference between behavior based on obligation versus behavior based on beliefs and/or values. One type of learning, single-loop, may be transitory, while the other, double-loop, is transformational. Transformational learning, within the context of organizational learning, was said by Argyris and Schön to alter traditional theories-in-use which can be defined as basic assumptions that guide practice. People within organizations need to discuss the undiscussable by challenging existing theories-in-use and questioning the assumptions upon which those theories are based.

Similarly, Marsick (1988) called for organizational members to engage in critical reflection. Critical reflection probes for assumptions, values, and beliefs that underlie action. Once these assumptions, values, and beliefs become explicit they can be tested, questioned and challenged. This process leads individuals and groups to understand the rationale behind actions, and it leads to learning that is rooted deep in values. The skill to critically reflect, and the learning which results from it, is akin to double-loop learning (Argyris and Schön 1978, 1996) or transformational learning (Mezirow 1991, 1996).

Senge (1990a, 1990b) suggested reflective thinking causes organizational members to consider their mental models and helps them develop personal mastery that is at the heart of a learning organization. It is through such development that generative learning takes place, that is, the ability to create something new which is of value to others. Viewing the whole organization, and not looking myopically and exclusively at component parts, allows shared visions to be developed by organizational members. Such holistic thinking is at the heart of systemic thinking which, according to Senge, must be present in order for a learning organization to evolve.

Research Question

Argyris and Schön (1996) noted that despite their efforts over years of qualitative research to find evidence of double-loop learning, such evidence occurred so infrequently, they referred to them as "rare phenomena" (p. 112). The development of transformational or double-loop learning capability is strongly advocated in the literature (Marsick, 1988; Marsick and Watkins, 1994; Senge, 1990a; Watkins and Marsick 1993). To encourage further study and to provide more substantial empirical grounding for Model-II, Argyris and Schön suggested a methodological approach different from those used in the past could be employed by engaging research that envisions and enacts organizational settings. This suggestion opens the door to examine Model-II under controlled conditions utilizing experimental designs.

In response to Argyris and Schön's suggestion, recent studies have tested Model-II utilizing experimental and quantitative methodologies (Kardatzke, 1996; Jeris, 1997; Ritchie, 1999). These studies provide a new approach to analyze Model-II, yet much work is needed to more fully understand the model's effects in organizations and the conditions that must be met in order to develop transformative learning capacity.

Each of the studies cited above examined Model-II in an holistic sense; they did not break the model into components to see which parts might have an impact on learning. This study continued the Model-II line of inquiry by individually testing the effects of the three Model-II governing variables by asking one fundamental question: Are there significant effects from any of the three Model-II variables on perceived team learning?

Methodology and Limitations

Overview of Methodology

To analyze the fundamental research question, a convenience sample of 80 people was drawn from a population of students enrolled Fall Semester, 2000 in the Business and Society course at Salt Lake Community College. Participation in the study was voluntary. A control group and an experimental group representing each Model-II variable were randomly selected from this sample. Each group was randomly divided into four teams of five people each. Participants were not informed that they were assigned to an experimental group or to the control group nor did they know that different groups were receiving different interventions until after the experiment was completed.

Each team met four times over a two-week period. Each meeting consisted of a 50 minute one clock hour class period. Thus, total intervention impact time was 320 clock hours (80 participants times four one clock hour meetings).

A facilitator trained in group facilitation and process implementation was hired to conduct the intervention for each treatment group. Each team within each group met in the same room. Teams among different groups, however, did not meet together. Team members had little opportunity to communicate with other teams within their respective groups, and they were instructed not to communicate with anyone about the study outside their assigned meeting times.

Each team was given a business problem to solve. The same problem was given to each team among all four groups. However, treatment between the experimental groups differed. For each experimental group team, an instrument designed to elicit behaviors associated with that team's randomly assigned Model-II variable was used and displayed during the team's discussions. As the facilitator worked with each team, she reminded team members of the displayed behaviors and encouraged those behaviors to surface and to be manifested in team actions.

All materials used in the experiment were collected at the end of each meeting and were redistributed at the beginning of the following meeting. At the conclusion of the last meeting all materials were gathered and kept by the researcher.

During the last meeting session, the Dimensions of a Learning Organization Questionnaire (DLOQ) (Watkins and Marsick, 1997) was administered. Construct validity of this instrument was tested and confirmed by Yang, Watkins, and Marsick (1998). The DLOQ instrument measures perceptions of organizational learning within groups (or teams) among seven dimensions. Each dimension can be scored separately, and an aggregate score can also be

calculated. This researcher was interested in how these interventions affected overall perception of team learning, therefore, this study did not examine differences between the seven dimension scores. Rather, aggregate DLOQ scores were used as the basis of comparison between and within treatment groups.

Demographic information was collected on each participant on a separate form at the time the DLOQ was administered. After group participants had completed the DLOQ they were debriefed, and disclosure was made regarding the purpose of the research and the different group treatments.

Aggregate DLOQ scores were analyzed between groups and between teams within groups through analysis of variance (ANOVA). Statistical analyses conducted for this study were performed using Statistical Package for the Social Sciences Version 8.0.

Missing Data

Missing data was minimal. Of 3440 possible data points (80 participants times 43 DLOQ items), only 12 items were not answered by participants, representing 0.35% of all possible data points. An additional three items, or 0.09% of the total, were double marked, meaning that more than one answer was given to a DLOQ response item. These double-marked entries were treated as missing data since it was not possible to determine the participants' intended answers. Missing data were replaced by the averages of individual scores for the given DLOQ items within the respective teams.

Hypotheses Tested

Hypothesis 1. There is no difference in aggregate DLOQ scores between the experimental group receiving valid information intervention and the control group.

Hypothesis 2. There is no difference in aggregate DLOQ scores between the experimental group receiving free and informed choice intervention and the control group.

Hypothesis 3. There is no difference in aggregate DLOQ scores between the experimental group receiving internal commitment intervention and the control group.

Hypothesis 4. There is no difference in aggregate DLOQ scores between experimental group teams receiving valid information intervention.

Hypothesis 5. There is no difference in aggregate DLOQ scores between experimental group teams receiving free and informed choice intervention.

Hypothesis 6. There is no difference in aggregate DLOQ scores between experimental group teams receiving internal commitment intervention.

Hypothesis 7. There is no difference in aggregate DLOQ scores between the control group teams.

Hypothesis 8. There is no difference in aggregate DLOQ scores between the experimental group receiving valid information intervention and the experimental group receiving free and informed choice intervention.

Hypothesis 9. There is no difference in aggregate DLOQ scores between the experimental group receiving valid information intervention and the experimental group receiving internal commitment intervention.

Hypothesis 10. There is no difference in aggregate DLOQ scores between the experimental group receiving free and informed choice intervention and the experimental group receiving internal commitment intervention.

Pilot Study

Prior to the study, a pilot study was conducted to provide a trial run of the procedures, instrumentation, and test statistics. The same facilitator was hired to conduct both the pilot project and the full study. The pilot project provided confidence that the procedures, instrumentation, and test statistics planned were appropriate. In addition, it

provided an opportunity to develop a method for dealing with missing data and absenteeism, established a data base format for data management, and provided a sample run of the statistics used in the full study.

Limitations

Two limitations of this study are worthy of note: (a) sample selection, and (b) impact of intervening variables and possible intervention effects.

Sample Selection. The convenience sample selection method employed in this study drew from a generally broad-based population, however, it did not represent an adult population at large. Care should be taken to not infer study results to external populations.

Impact of Intervening Variables and Intervention Effects. Four possibilities exist in considering the effects of the Model-II intervention. There is insufficient evidence to ascertain definitive claims as to which of these four possibilities occurred. First, it is possible the intervention did not impact DLOQ scores, and that any significant effects may have resulted from non-controlled or intervening variables. Second, it is possible the Model-II intervention effects may have impacted DLOQ scores in the opposite way from what was anticipated. Third, it is possible the effects of the Model-II intervention may have affected DLOQ scores as anticipated, leading to higher DLOQ scores, but that the effects of non-controlled or intervening variables were stronger than the effects of the Model-II variables, thus overshadowing evidence of Model-II impact. Fourth, it is possible the effects of the Model-II intervention were weakened by isolating the three variables into separate treatment groups, thus rendering a less effective impact on perceived learning.

Results and Findings

Analysis of Hypotheses

Each of the ten hypotheses is analyzed below. A one-way ANOVA with 4 levels, one level for each treatment group, was conducted to analyze Hypotheses 1 through 3 and 8 through 10 (Table 1). Separate one-way ANOVAs were conducted to analyze each of the remaining 4 hypotheses (Table 1). For all ANOVAs the alpha level was set at .05.

Hypotheses 1 - 3. ANOVA results indicated sufficient evidence exists to suggest there is a significant difference between aggregate DLOQ scores by treatment group, $F(3,76) = 3.622$, $p < .05$. Post hoc testing was conducted utilizing the Tukey Honestly Significant Difference (Tukey HSD) method. Results of these tests show sufficient evidence ($p < .05$) to suggest the mean of the valid information group is significantly lower than the control group mean and that the mean of the free and informed choice group is significantly lower than the control group mean. There was not sufficient evidence ($p > .05$) to suggest the mean of the internal commitment group was significantly different from the control group mean, although the internal commitment group mean was lower than the control group mean.

Hypothesis 4. A one-way ANOVA was performed comparing aggregate DLOQ scores between the four teams within the valid information experimental group. Results of this ANOVA indicated there is sufficient evidence to suggest the means of the teams within the valid information treatment group are significantly different, $F(3,16) = 3.688, p < .05$. Tukey HSD post hoc tests revealed significant differences ($p < .05$) between Teams 3 and 4.

Hypothesis 5. A one-way ANOVA was performed comparing aggregate DLOQ scores between the four teams within the free and informed choice experimental group. Results of this ANOVA indicated there is not sufficient evidence to suggest the means of the teams within the free and informed choice treatment group are significantly different, $F(3,16) = 1.421, p > .05$.

Hypothesis 6. A one-way ANOVA was performed comparing aggregate DLOQ scores between the four teams within the internal commitment experimental group. Results of this ANOVA indicated there is sufficient evidence to suggest the means of the teams within the internal commitment treatment group are significantly different, $F(3, 6) = 9.483, p < .01$. Tukey HSD post hoc tests revealed significant differences ($p < .05$) between Teams 1 and 3 and between Teams 3 and 4.

Hypothesis 7. A one-way ANOVA was performed comparing aggregate DLOQ scores between the four teams within the control group. Results of this ANOVA indicated there is sufficient evidence to suggest the means of the teams within the control group are significantly different, $F(3,16) = 3.605$, $p < .05$. Tukey HSD post hoc tests revealed significant differences ($p < .05$) between Teams 2 and 4.

Hypotheses 8 - 10. ANOVA results show sufficient evidence to suggest there is a significant difference between aggregate DLOQ scores by treatment group, $F(3,76) = 3.622$, $p < .05$. However, in examining post hoc tests using the Tukey HSD method, there is not sufficient evidence ($p > .05$) to suggest the means of any of the experimental groups were significantly different from each other.

Table 1. *Results of One-way ANOVAs Based on Aggregate DLOQ Scores*

Variable	*Between MS*	*df*	*Within MS*	*df*	*F*
Treatment Groups	4359.17	3	1203.49	76	3.622***
EGVI*	2676.63	3	725.76	16	3.688**
EGFC*	1756.51	3	1236.13	16	1.421
EGIC*	5196.16	3	547.93	16	9.483***
CG*	3014.18	3	836.08	16	3.605**
Education	7031.74	2	1175.05	77	5.984***
Employment	4928.41	2	1229.68	77	4.008**
Gender	2704.11	1	1305.62	78	2.071
Education- Female	558.21	2	879.15	24	.539
Employment- Female	292.88	2	901.26	24	.325
Education- Male	8533.71	2	1251.10	50	6.821***
Employment- Male	10131.31	2	1187.19	50	8.534***

*EGVI- Experimental Group Valid Information; EGFC- Experimental Group Free and Informed Choice; EGIC- Experimental Group Internal Commitment; CG- Control Group.
** $p < .05$; *** $p < .01$.

Discussion

Results showed a significant difference in mean aggregate DLOQ scores between the control group and the valid information experimental group and between the control group and the free and informed choice experimental group. There was not a significant difference between the control group and the internal commitment experimental group. In short, for each of the three experimental groups, the aggregate DLOQ score means were lower than the mean of the control group with significant differences between the control group and two of the three experimental groups.

An underlying premise inherent in this study, based on studies by Kardatzke (1996), Jeris (1997), and Ritchie (1999), suggested that if there were a significant main effect, the experimental group means would have been higher than the control group mean. However, the opposite occurred; perceptions of team learning were lower, as measured by the DLOQ instrument, for those groups that received a Model-II intervention. Three areas of inquiry provide explanations that may account for these unanticipated differences: (a) type-I error probability, (b) internal and external validity, and (c) demographic variables. Each of these three areas is discussed below.

Type-I Error. The probability of committing a type-I error was calculated to be .017, suggesting there is only a 1.7% probability that there is no significant difference in aggregate DLOQ scores between the control group and at least one of the three experimental groups. This probability is well within the stated alpha level of .05.

Internal and External Validity. The significant differences discussed in relation to Hypotheses 4, 6, and 7 provide an indication that validity issues may have accounted for differences between teams within treatment groups. Yet in analyzing validity factors, there was inclusive evidence that such factors affected DLOQ scores.

Demographic Data Analysis. Education level, employment status, and gender data were collected on each participant. While it was not an objective of this study to measure the effects of these variables on aggregate DLOQ scores, in pursuing reasons why the control group mean was higher than all three experimental groups and significantly higher than two of the experimental groups, it was believed an analysis of these demographic variables might provide insight for this seemingly inverse relationship between treatment condition and aggregate DLOQ scores. This analysis proved fruitful in explaining possible influences on aggregate DLOQ scores.

Separate one-way ANOVAs were performed for education level, employment status, and gender (Table 1). Results of the education level ANOVA showed a significant difference between levels of education and aggregate DLOQ scores, $F(2,77) = 5.984$, $p < .01$. Tukey HSD post hoc tests revealed that those with bachelor's degrees had significantly lower aggregate DLOQ scores than those with associate's degrees or those with high school completion or less. It should be noted, however, that the associate's degree and bachelor degree levels had only six participants and two participants, respectively.

The ANOVA for employment status showed a significant difference in aggregate DLOQ scores between different levels of employment status, $F(2,77) = 4.008$, $p < .05$. Tukey HSD post hoc tests revealed participants who were employed full-time had significantly lower aggregate DLOQ scores than did those who were not employed. Further, the mean aggregate DLOQ scores across all three levels of employment status declined as employment status advanced from not employed to employed full-time.

The ANOVA for gender did not show a significant difference in aggregate DLOQ scores between males and females, $F(2,77) = 2.071$, $p > .05$. However, when education level and employment status were examined by female and male participants separately, significant differences were found.

For female participants, significant differences in aggregate DLOQ scores were not evidenced at different levels of education and employment status, $F(2,24) = .635$, $p > .05$, and $F(2,24) = .325$, $p > .05$, respectively. In contrast, significant differences in aggregate DLOQ scores were manifested among different levels of education and employment status for male participants, $F(2,50) = 6.821$, $p < .01$, and $F(2,50) = 8.534$, $p < .01$, respectively. In both analyses, scores for males were generally higher than scores for females. Post hoc tests could not be performed for education level when filtered for males because the bachelor's degree level had only one male participant. For employment status, however, Tukey HSD post hoc tests revealed male participants in the full-time employment category had a significantly lower mean score than male participants in both the part-time and not currently employed categories.

From this information it appears there may be an interaction between gender and education level and between gender and employment status. That is, there is evidence to suggest that the effects of education level and employment status on aggregate DLOQ scores depends on gender. To test these possible interactions, two two-way ANOVAs were performed, one for gender and education level and another for gender and employment status.

The two-way ANOVA for gender and education level (Table 2) did not suggest a significant interaction, $F(2,74) = 2.094$, $p > .05$, but, like the one-way ANOVA, it did reveal a significant main effect for education level, $F(2,74) = 5.709$, $p < .01$. However, in reviewing the interaction plot, gender lines crossed through different levels of education, suggesting a disordinal interaction. When education level was filtered by gender, a significant difference was found with males but not with females. Thus, although an interaction was not found with the two-way ANOVA, perhaps an interaction exists nonetheless. Care should be taken, however, in drawing a conclusion because the analysis presents mixed results, and there were only eight participants in the associate's degree and bachelor's degree levels.

Table 2. *Results of Two-way ANOVA for Education Level and Gender Based on Aggregate DLOQ Scores*

Source	*SS*	*df*	*MS*	*F*
Education level (E)	12907.77	2	6453.88	5.709*
Gender (G)	1751.05	1	1751.05	1.549
E X G	4734.82	2	2367.41	2.094
Error	83654.41	74	1130.47	

*$p < .01$.

Results of the two-way ANOVA for gender and employment status (Table 3) revealed a significant interaction, $F(2,74) = 4.374$, $p < .05$, and the interaction plot suggested a disordinal interaction as two gender points crossed

through different levels of employment status. This analysis is consistent with that of the one-way ANOVA which suggested an employment status main effect when data was filtered for males but not when filtered for females.

Table 3. *Results of Two-way ANOVA for Employment Status and Gender Based on Aggregate DLOQ Scores*

Source	*SS*	*df*	*MS*	*F*
Employment status (E)	4306.14	2	2153.07	1.967
Gender (G)	5539.82	1	5539.82	5.062*
E X G	9575.22	2	4787.61	4.374*
Error	80989.87	74	1094.46	

*$p < .05$.

This analysis of demographic variables may lead to two assumptions that could explain the outcomes of this study. First, the effects of education level on aggregate DLOQ scores may depend on gender. Second, the effects of employment status on aggregate DLOQ scores may depend on gender.

Data tabulated from the sample seem to support these assumptions. In reviewing cross tabulations for males by part-time employment and less than an associate's degree, the data shows the control group had higher counts of males who were employed part-time and who had less than an associate's degree than any of the three experimental groups.

Upon analyzing the two assumptions stated above within teams across treatment groups, higher mean aggregate DLOQ scores were generally found to exist among males with lower levels of education and who worked less than full-time. This may explain the significant differences found in the analyses of Hypotheses 4, 6, and 7. Further, the two groups that had significantly different aggregate DLOQ scores from the control group had fewer males, fewer people with less than an associate's degree, and fewer people who worked less than full-time.

Conclusion

Results of this study generally found that the effects of any of the three Model-II governing variables as measured in this study are uncertain. While significant differences were found between the control group and two of the experimental groups, free and informed choice and valid information, the control group mean was higher than the three experimental group means. It was assumed that significant differences would have revealed opposite results. It is inconclusive whether the intervention affected perception of team learning to be lower than anticipated or whether other variables accounted for these results.

In examining the data, three possibilities were considered: (a) type-I error probability, (b) internal and external validity, and (c) demographic variables. Of these three possibilities, the effects of demographic variables hold the most promise for explaining significant differences between the experimental and control groups with the strongest explanation evidenced by a significant interaction between employment status and gender. Males who worked less than full time and had less than an associate's degree generally reflected higher DLOQ scores than other participants.

Contributions

This study makes a contribution to new methods for Model-II inquiry and provides encouragement and justification for more extensive studies that employ sample selection techniques that draw from a broader-based population. The study may be used in comparison to future studies to either increase or decrease acceptance for Model-II by providing indication of Model-II impact on organizational learning, as well as the effects of demographic variables on organizational learning such as employment status, education level, and gender.

Recommendations for Future Research

Possibilities for additional inquiry are suggested below.

Replicate this study while controlling for gender, education level, and employment status to test the effects of the interaction of education level and gender and the interaction of employment status and gender on perceived team learning. Assess whether Model-II intervention effects lead to lower or higher perceived team learning scores or if there is no change in perceived team learning.

Repeat this study while drawing randomly from a broader-based population, then compare results of this study to the intervention effects of the new study.

Develop an intervention that could be applied to a sample population within an organization to test for organizational learning as opposed to organizational learning within teams.

Develop an intervention where the Model-II variables are tested in isolation from one another as well as holistically.

Conduct longitudinal studies which measure retention of Model-II impact on team and/or organizational learning.

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Training for Team-Based Work: A Study on the Relation between the Organization of Teamwork and Team Training

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This paper describes a comparative case study among 27 organizations from the industrial and services sectors, which have introduced team-based work. Teamwork is often associated in literature with better opportunities for employee development than traditional work systems (e.g., Ellström, 1999). Variations in team training were found to be unrelated to differences in the organization of teamwork. The self-directed teams in our sample did not provide a better, or even different, training context to their members than other teams did. The study raises questions about the prevalence of teamwork as a context for learning and discusses some directions for further research.

Keywords: Team-Based Work, Team Learning, Comparative Case Study

The subject of learning and training in work teams and groups has received a lot of attention over the past decade. Groups and work teams have always been regarded as contexts for employee development in literature on organizational development (French and Bell, 1995; Brown and Keep, 1999). The topic is also an object of concern in literature on the learning organization (Watkins & Marsick, 1993). Groups and work teams are considered powerful learning environments (Tjepkema, Kessels, & Smit, 1999; Onstenk, 2001) and work is increasingly expected to be organized in teams (Ellström, 2001).

Learning in groups is often studied in an experimental laboratory setting, with groups made up especially for the experiments concerned and consisting predominantly of students (Jeris, 1998). Also, there have been studies of managerial teams (e.g., Burgoyne & Reynolds, 1997), interdisciplinary teams (e.g., Cooley, 1994), and temporary project groups (task forces). Production teams, engaged in the primary process of an organization, however, have rarely been at the focus of empirical research (Hendry, 1996; Imel, 1996; Willis & Boverie, 1998).

What we do know from empirical research, however, is that in practice groups and teams as organizational forms turn out to be less prevalent then predicted (Benders, 1999; Dankbaar, 2000; Sey, 2001). Furthermo re, empirical research provides little evidence for the high expectations concerning their performance, opportunities for participation, member satisfaction and motivation (Boot & Reynolds, 1997; Poutsma, 1998; Russ-Eft, Preskill, & Sleezer, 1997). Moreover, empirical results sustaining the alleged learning potential of group work are scarce (Van Klaveren & Tom, 1995; Hoogerwerf, 1998; Willis & Boverie, 1998). *NB Because of space constraints not all Dutch studies are included in the reference list. A full paper containing those will be handed out at the conference.*

Theoretical Framework and Research Questions

Ellström (2001) distinguishes between traditional and learning-intensive work systems. Traditional work systems are characterized by a high degree of specialization, standardization, individualization, and supervisory control. Learning-intensive work systems, on the other hand, have integrated tasks and functions, informal communication, a team-based work structure, and a control system based on self-management (cf. Table 1). Onstenk (2001) presents similar ideas about the relationship between the characteristics of work and its learning potential.

Table 1. *Traditional and Learning-Intensive Work Systems (Ellström, 2001).*

Aspects of Work Design	Traditional Work Systems	Learning-Intensive Work Systems
Division of Labor	High degree of specialization (functional orientation)	Integration across tasks and functions (process orientation)
Co-ordination	Standardization through formal instructions and rules	Informal communication and mutual adjustment
Work Structure	Individualized	Team-based
System of Control	Supervision	Self-management

In the Netherlands, team-based work has been studied intensively (e.g., Van der Klink & Ter Horst, 1988; Hoogerwerf, 1998). Team-based work has been introduced in a number of companies in the Netherlands. In 1996, the Business School of Nijmegen University carried out a structured qualitative investigation into team-based work in forty of such companies. The principal questions in this survey were: In what ways are companies implementing team-based work and what forms of team-based work are they using? In addition, the investigation contained a number of questions about the ways in which the learning of team members is organized. This paper is based on a secondary analysis of data from said investigation. It aims to study empirically the relation between the way work is organized in teams and the organization of their training. The analysis will enable us to test for the Dutch situation whether the positive expectations about the learning potential of team-based work have an empirical basis.

Team-based work comes in a variety of forms (Hackman, 1991; Van Hooft, De Nijs & Poutsma, 1997). Whereas the content and organization of work in self-directed teams are assumed to result in learning-intensive arrangements (Ellström, 2001), more traditional teams are expected to be less proactive in organizing their own training arrangements. In other words, following the ideas of Ellström (2001) described above, one expects to find at least a certain relationship between various forms of team-based work and the way in which training in these teams is organized.

The following three questions will thus be investigated in the current study:

1. How exactly is work organized in team-based work?
2. How do work teams organize the training of their members?
3. Is there a relationship between the way teams organize their work and the organization of training in these teams?

Research Methodology

Forty large Dutch companies were approached, twenty-seven of which turned out to be suitable for an analysis of training data. Among these companies twenty-two were in the industrial or manufacturing sector (e.g., energy, printing, and nutrition firms) and five in the logistics or financial services sector (e.g., banking, auction, and insurance companies).

One well-informed representative, usually the personnel or production manager, from each organization was interviewed face-to-face. Prior to these intensive interviews, the researchers had studied documents on the company and its teamwork system. During the interview, which usually lasted between two or three hours, the company representative together with the researchers completed an elaborate pre-structured questionnaire containing fifty-eight questions (some open, most of them closed but complex).

The study was designed as a comparative qualitative case study among twenty-seven organizations. The data provides a picture at a singular moment in time of the way these companies have organized team-based work and how they deal with training in their teams. Two groups of variables were constructed from the data set for this study:

1. Variables concerning the organization of work: for example, team responsibilities, co-ordination, consultation, and authority.
2. Variables concerning the organization and content of training in teams: for example, team participation in training, available learning activities, specific focus on training for team-based work, amount of training.

Analysis of the first two research questions involved frequency distributions for the main work and training variables, clustering of teams in terms of their organization of work, and clustering of teams in terms of their organization of training.

For the third research question the training clusters and variables were related to the work clusters and variables. Cramer's V was used to determine the relationship between the work clusters and the training clusters, with Monte Carlo sampling procedures to test the significance of this relationship. In order to test the relationship between the work variables and the training variables Kruskal-Wallis tests were used (test statistic H).

Results

The results section is structured along the three research questions. First, the organization of work in our sample will be presented. Second, the focus will be on training for team-based work. Third, we describe the outcomes concerning the relationship between work and training in teams.

The Organization of Work in Teams

Respondents were asked to what extent various actors were responsible for different team tasks. The various actors include team members, the team leader, and external actors (e.g., managers and organizational staff members

positioned outside the team). Their responsibilities concern three sets of team tasks related to the production process:

1. *Regulatory tasks:* taking care of technical, logistical, quality, and personnel issues.
2. *Authority tasks:* deciding about the flow of orders, means, and personnel.
3. *Standard-setting tasks:* setting team standards, both on the individual and team level.

Table 2 presents the results for this question. In our sample of twenty-seven cases, team members often have responsibility for performing regulatory tasks. In large majority, team members are responsible also for decisions about the order and personnel flows. The team leader has responsibility mostly for deciding on the order and personnel flows and for setting the team standards. Actors outside the team have responsibility mainly for the regulatory tasks of the team.

Table 2. *Responsibilities of the Various Actors in and outside the Teams (n = 27).*

	Actors		
Responsibility	Team Members	Team Leader	Outside of Team
For Regulatory Tasks			
Technical Issues	25 (93 %)	3 (11 %)	22 (81 %)
Logistical Issues	25 (93 %)	13 (48 %)	14 (52 %)
Quality Issues	25 (93 %)	11 (41 %)	18 (67 %)
Personnel Issues	21 (78 %)	8 (30 %)	19 (70 %)
For Authority Tasks			
Over Order Flow	24 (89 %)	14 (52 %)	21 (78 %)
Over Flow of Means	12 (44 %)	6 (22 %)	23 (85 %)
Over Personnel Flow	22 (81 %)	16 (59 %)	20 (74 %)
For Standard-Setting Tasks			
At Team Level	10 (37 %)	10 (37 %)	11 (41 %)
At Individual Level	6 (22 %)	13 (48 %)	5 (19 %)

Looking at the distribution of responsibilities among the various actors, most of the regulatory tasks are the responsibility of team members as well as actors outside the team. The team leader has some responsibility for logistical and quality affairs as well. In terms of responsibility for authority tasks, once again team members and actors outside the team are dominant. On average, however, outside actors have the largest responsibility for the flow of means. The team leader is responsible, to a moderate extent, for the order and personnel flows as well. Standard setting occurs in less than half of our sample. Responsibility for it is distributed evenly among the actors as far as the team level is concerned, but for the individual level it is mainly in the hands of the team leader.

For each of the twenty-seven companies, it was then determined to what extent team members, the team leader, and external actors were responsible for performing the main team tasks described in Table 2. Based on these data, four clusters of teams were distinguished that differ in terms of the division of work responsibilities among the various actors:

I. *Independent, self-directed work teams.* In these teams external actors have delegated responsibility for the main tasks to the team members, without making a team leader responsible. This cluster contains ten cases (37 per cent).
II. *Guided, self-directed work teams.* In this cluster both the team leader and members are responsible for the main tasks. Four cases from our sample fall into this category (15 per cent).
III. *Guided, partially self-directed work teams.* The team members and leader have responsibility for a number of tasks, however in this cluster their impact is limited by external actors. Two cases fit this description (8 per cent).
IV. *Externally directed work teams.* These teams are directed by external actors and have limited responsibility themselves for the main team tasks. This cluster contains eleven cases (41 per cent).

The Organization and Content of Training

This paragraph presents the data from our sample on team participation in training-related activities, types of training, specific focus on training for team-based work, and the amount of training.

Team Participation in Training-Related Activities. Respondents were asked to indicate the extent to which team members, the team leader, and external actors participate in three key training-related activities:

1. *Priorities:* establishing the priorities for team training.

2. *Needs:* determining the training needs for the team.
3. *Execution:* performing actual training activities.

Table 3 describes the results for this question. In most of the teams training issues are dealt with by team members themselves rather than by the team leader or by external actors. The latter do not participate in training-related activities at all in a majority of the cases. Team members have the largest impact when it comes to the execution of training. Both the team leader and outside actors have some involvement in establishing priorities and assessing training needs, but they play no role of importance in training execution.

Looking at the distribution of responsibility for training issues among the various actors, the execution of training seems to be a task mainly for the team members themselves (please note that no specific data are available about the participation of training professionals). Assessment of training needs and setting priorities for training occur less often, but can be the responsibility of any actor when they do take place.

Table 3. *Participation of the Various Actors in Training-Related Activities (n = 25; missing data = 2).*

	Actors		
Training-Related Activities	Team Members	Team Leader	Outside of Team
Priorities, Needs, and Execution	6 (24 %)	3 (12 %)	1 (4 %)
Priorities and Needs	0 (0 %)	4 (16 %)	6 (24 %)
Priorities Only	0 (0 %)	3 (12 %)	3 (12 %)
Needs and Execution	5 (20 %)	1 (4 %)	0 (0 %)
Execution Only	14 (56 %)	0 (0 %)	0 (0 %)
No Involvement in Training at All	0 (0 %)	16 (64 %)	17 (68 %)

For each of the twenty-five organizations, it was then determined to what extent team members, the team leader, and external actors participate in the three key training-related activities described in Table 3 (priorities, needs, and execution). Thus, a team participation pattern for training-related activities was determined in each case. Based on these data, three clusters were created that differ in terms of the way in which teams distribute the responsibility for training-related activities among the various actors:

I. *Teams with member-driven training.* In these teams the members themselves organize the main activities of establishing priorities for training, determining training needs, and executing training. The team leader and external actors are not involved in training. This cluster contains six cases (24 per cent).
II. *Teams with leader-driven training.* In this cluster the team leader sets the conditions (priorities and sometimes needs) for training. The team members are responsible for the execution of training, within the boundaries of that framework. In a few companies the team leader is involved in training execution as well. Ten cases from our sample fall into this category (40 per cent).
III. *Teams with externally driven training.* In these teams actors outside the team set the conditions (priorities and needs) for training. These external actors can be training professionals, personnel officers, and / or middle managers. The team members are involved only in the execution of training. Nine cases fit this description (36 per cent).

Types of Training: Organization and Content. Respondents were asked to indicate what part of team training is organized on and off the job, respectively. Table 4 shows these proportions for the teams in our sample. In only six cases (27 per cent) the proportion of off the job training (classroom based) exceeds one half. Fourteen companies (63 per cent) feature teams in which off the job activity constitutes just a small or moderate part of training. On the job training (in the workplace), on the other hand, represents a (very) large proportion of team training in thirteen cases (59 per cent), whereas only nine companies (41 per cent) report its proportion to be small or moderate. Roughly speaking, there is more on the job training in most teams than there is off the job training.

Combining the data on off and on the job training for each company, it is possible to determine whether the *organization* of team training is limited or multiple in character. Five companies (23 per cent) limit the organization of their team training mostly to off the job activities. In eleven cases (50 per cent) the organization of team training is limited mostly to on the job activities. A multiple organization of team training, combining on and off the job training in equal measures, can be found in six companies (27 per cent). Please note that no questions were asked about the proportion of non-formal or informal learning activities in the teams.

Table 4. *Proportions of Team Training Organized Off and On the Job (n = 22; missing data = 5).*

Proportion	Off the Job Training	On the Job Training
Very Small (< 10 per cent)	2 (9 %)	0 (0 %)
Small (10-20 per cent)	8 (36 %)	3 (14 %)
Moderate (21-49 per cent)	6 (27 %)	6 (27 %)
Large (50-69 per cent)	6 (27 %)	8 (36 %)
Very Large (> 70 per cent)	0 (0 %)	5 (23 %)

Respondents were asked also about the *content* of team training, specifically to what extent team members are trained in preparation for new jobs, both initially and additionally. This can be regarded as an indication of the extent to which the *content* of team training is narrow or broad in nature. As Table 5 shows, 40 per cent of the companies organize both initial and additional job preparation training for all team members, resulting in a broad content profile. In 25 per cent of the cases, only some team members receive both initial and additional job preparation training ('moderate'), while 20 per cent organize only initial OR only additional training for job preparation ('narrow'). Three companies (15 per cent) offer no job-related training at all, only about specific topics (e.g., management, communication, and so forth).

Table 5. *Content of Team Training: Broad or Narrow (n = 20; missing data = 7).*

Training Content	n
Broad (Initial and Additional Job Preparation for All)	8 (40 %)
Moderate (Initial and Additional Job Preparation for Some)	5 (25 %)
Narrow (Only Initial OR Only Additional Job Preparation)	4 (20 %)
Specific Only (Non-Job Related)	3 (15 %)

Specific Focus on Training for Team-Based Work. Table 6 describes the extent to which training in our sample is specifically focused on the implementation of team-based work. In more than half of the cases only a small proportion of training has this focus, whereas just one company (5 per cent) devotes a large part of its training specifically to team-based work issues. Apparently, the implementation of team-based work does not lead to much specific training for team members.

Table 6. *Proportion of Training Specifically Focusing on Team-Based Work (n = 21; missing data = 6).*

Proportion	n
Very Small (< 10 per cent)	3 (14 %)
Small (10-20 per cent)	12 (56 %)
Moderate (21-49 per cent)	5 (24 %)
Large (50-69 per cent)	1 (5 %)
Very Large (> 70 per cent)	0 (0 %)

Amount of Training. Respondents were asked how many days per year their employees spend on training. As Table 7 shows, in 41 per cent of the companies employees spend less than six days on training each year. Six to ten days of training per year is taking place in another 41 percent of the cases, while the rest of the sample (17 per cent) even exceeds the ten-days per year limit.

Table 7. *Number of Days per Year that Employees Spend on Training (n = 24; missing data = 3).*

Amount	n
Small (2-5 Days)	10 (41 %)
Moderate (6-10 Days)	10 (41 %)
Large (> 10 Days)	4 (17 %)

The Relationship between Work in Teams and their Training

In this paragraph the results concerning the relation between team-based work and team training are addressed. Table 8 juxtaposes the four types of teamwork (derived from Table 2) with the three training participation patterns for teams (derived from Table 3). As a reminder, the four teamwork clusters were established on the basis of the distribution of responsibilities for work tasks among the various actors. Likewise, the three training clusters are based on the division of responsibilities for training tasks among team members, team leader, and external actors. The correlation between the two types of clusters as expressed in Cramer's V is .32. The relationship, however, is not statistically significant. This means that the organization of work in teams, within our sample, is not related to the way these teams organize their training. Nor were statistically significant differences found between the four teamwork clusters with respect to the variables presented in Tables 3 through 8.

Table 8. *Four Team Types Related to Three Training Participation Patterns (n = 25; missing data = 2).*

	Training Participation Pattern			
Types of Work Team	I. Teams with Member-Driven Training	II. Teams with Leader-Driven Training	III. Teams with Externally Driven Training	*Total*
A. Independent, Self-Directed Work Teams	3	4	2	*9*
B. Guided, Self-Directed Work Teams	1	1	2	*4*
C. Guided, Partially Self-Directed Work Teams	0	2	0	*2*
D. Externally Directed Work Teams	2	3	5	*10*
Total	*6*	*10*	*9*	*25*

(Note: Cramer's V = .32 ; p = not significant)

Conclusions and Discussion

In this section conclusions are drawn about our three research questions and some points for discussion are raised.

How Is Team-Based Work Organized?

In our sample four types of teams can be distinguished. The largest cluster are the *externally directed* work teams, who have limited responsibilities for core team activities like performing regulatory tasks, authority tasks, and standard-setting tasks. Just behind in terms of numbers are the *independent, self-directed* work teams, where the team members have been delegated full responsibility for these tasks by managers and organizational staff members outside the team. Two smaller clusters emerged as well. First, in *guided, self-directed* work teams, the members themselves and the team leader share responsibility. Second, in *guided, partially self-directed* work teams, external actors share part of the responsibility for team tasks with the members and team leader.

It can be concluded that, even in our relatively small sample, quite a variety of different work teams can be found. This is a bit surprising, because for this survey no random sampling of companies was performed. Organizations were asked to participate if they were known to have implemented teamwork or to be well in the process of doing so. In view of this, the number of externally directed work teams in our sample is rather high. This finding is in line, however, with empirical studies by Benders (1999) and Dankbaar (2000), who concluded also that teamwork is not yet as widespread as often assumed.

How Is Training Organized in Work Teams?

Three training participation patterns were established in our sample, on the basis of the division of responsibilities for key team training activities like priority setting, needs assessment, and training execution. The largest cluster are teams with *leader-driven* training, meaning that the team leader sets the conditions (priorities and needs) and the team members are responsible for the execution of training. The second largest group are teams with *externally driven* training, where managers and (probably) training professionals outside the team set the conditions and the team are involved in executing the training. The smallest contingent are teams with *member-driven* training,

who are fully responsible for all their own training arrangements and see no participation in training by the team leader or external actors.

There appears to be more on the job training in our sample of teams than there is training off the job. Only a small number of companies organize multiple forms of training, with significant training arrangements in place both off and on the job. Training content can be labeled broad, on average, in that a substantial number of organizations (40 per cent) offer all their team members initial and additional job preparation training. Most companies dedicate only a small proportion of their training to specific team-based work issues. The general amount of training for employees is rather large, however, ranging from six to ten days or more per year in almost 60 per cent of our cases.

It can be concluded that there is a diversity of ways in which teams organize their training. As with the organization of work, however, team-driven training is less prominent than perhaps expected. The organization and content of team training show considerable variation, in many respects, across the cases in our sample. It is not very surprising that on the job training occurs more often than off the job training, nor that few companies pay a great deal of attention to specific training for team-based work. In this connection it is good to note, however, that the survey did not contain any questions about non-formal and informal learning in teams. One would expect these activities to take place rather frequently, certainly relative to formal training arrangements (Marsick & Watkins, 1990).

Are Teamwork and Team Training Related?

This is probably the key question in the current study, and it yields quite a surprising answer. In no way have we been able to establish a relationship between the organization of work in teams, on the one hand, and the organization of team training, on the other hand. The four types of teamwork that emerge are not related to the three training participation patterns that can be distinguished (cf. Table 8). To put it differently, the division of work responsibilities among team actors is not connected to the way in which team training responsibilities are distributed. Moreover, all other training variables in our study (cf. Table 9) show no significant relationships to the teamwork clusters, either. Even when training variables are correlated to work variables at item level, results of which are not presented in this paper, only a random pattern of 'statistically significant' (but theoretically irrelevant) relations comes up.

Although surprising in view of the idea that teamwork provides a better learning environment than traditional work systems (Ellström, 2001; Tjepkema, Kessels, & Smit, 1999; Onstenk, 2001), the findings are largely in line with the small number of other empirical studies on this topic. The high expectations concerning performance, opportunities for participation, member satisfaction and motivation in teams are not met in practice (Boot & Reynolds, 1997; Poutsma, 1998; Russ-Eft, Preskill, & Sleezer, 1997). What is more, the alleged learning potential of teamwork is only scarcely supported in empirical investigation (Van Klaveren & Tom, 1995; Hoogerwerf, 1998; Willis & Boverie, 1998).

Limitations of the Study

It has to be noted that the survey used for our secondary analysis did not contain any questions about non-formal or informal learning, only about on and off the job training. For a more comprehensive understanding of the relationship between teamwork and learning processes in teams it would be good to include such topics in future surveys.

Another limitation of this study lies in the fact that the main respondents were personnel and production managers only, who were asked mainly about the system of teamwork. In order to get an in-depth view of learning taking place in teams it would be good to interview team members, team leaders, and training professionals as well, and to ask more questions about actual learning processes that occur.

Implications of the Study and Contribution to New HRD Knowledge

Even taking into account its limitations, this study raises serious questions about the prevalence of teamwork as a context for learning. First, how come work in so many teams is other than self directed? Second, why are training priorities and needs assessment the responsibility of team members in so few cases? Third, and most interesting, what does it mean that the variation in team training is not related to the variation in teamwork?

One would expect, certainly following the ideas of Ellström (2001) about learning-intensive work systems, that self-directed teams would have different, if not better, training arrangements in place. For example, extensive participation of team members in training, a multiple organization of team training, a broad training content, specific training for team-based work, a large amount of training. But none of these occur more frequently in the self-directed teams within our sample. In fact we found no differences in training variables to be related to differences in the organization of teamwork. There is no evidence, from our study, that self-directed teams provide a better, or even

different, training context to their members than, for instance, externally directed teams do. The organization of work and the organization of learning, to a large extent, have their own dynamics. Going one step further, there would be little reason to justify the implementation of team-based work solely by claiming that the learning potential of work will improve. There may be other promising ways to put 'learning' high on the agenda of enterprises. In other words, we should be more careful to proclaim teams as *the* work type for future 'learning organizations'.

All this does not explain *why* the implementation of teamwork and the organization of team training are apparently unrelated. This may have to do with the fact that in team learning literature (e.g., Ellström, 2001; Onstenk, 2001) most attention is paid to the organization of work and to the structural conditions for collaboration and communication in teams. Relatively little is known as yet about the actual processes of ('informal') learning that takes place in work teams, about the viewpoints on learning of the team members themselves, about their perceptions of learning opportunities and blockages, about the practical strategies that they employ in order to learn what they deem necessary and how they see fit. Future research should focus also on these elements to provide a richer picture of team learning in companies.

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Collaboration in a Virtual Team Environment: A Case Study in Planning the ASTD/AHRD 2001 Future Search Conference

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This case study explores the learning outcomes for the virtual team that planned the 2001 Future Search Conference for ASTD and AHRD. Team members completed the Global Process Team Questionnaire (GTPQ) and participated in interviews to determine effectiveness factors in team design, individual inputs, and process criteria. Results indicate that pre-existing relationships established trust in the virtual environment and supported the workload according to individual talents and interests.

Keywords: Virtual Teams, Collaborative Learning, Future Search Conference

This case study explores collaboration in a virtual team environment for the nine members who planned and organized the 2001 Future Search Conference that was sponsored by the American Society of Training and Development (ASTD) and the Academy of Human Resource Development (AHRD) in Orlando, Florida. A Future Search Conference is a large group strategic planning process that brings together key stakeholders in an attempt to get the "whole system" in the room to envision a desired future for a task of vital importance to an organization or community (Weisbord, 1992; Weisbord & Janoff, 2000).

In February 2001, the ASTD Research-to-Practice Committee, composed of a mix of practitioners, consultants, and academics, met to develop a conceptual outline for a Future Search conference to inform the HRD profession of the future of workplace learning and performance. The execution of the project was assigned to a team of volunteer ASTD members, dubbed the Future Search Steering Group (FSSG). This team, with the assistance of a Future Search facilitator, had four months to put together the conference without benefit of a face-to-face meeting. The conference was successful and currently serves as the foundation for continuing work within ASTD and AHRD. This case study describes the experiences of the FSSG team and provides useful lessons on collaboration in a virtual environment.

Problem Statement

Very little formal research has explored the effectiveness of virtual teams (Furst, Blackburn, & Rosen, 1999), even though trends towards globalization and enhancements in communication technology have made virtual teaming an integral part of most small group work (Katzenbach & Smith, 2001). Different time, space, and culture factors add to the complexity of collaboration in a virtual environment (Duarte & Snyder, 2001; Fisher & Fisher, 2001). In addition to these factors, the Future Search planning team was composed primarily of volunteers, an aspect of team participation that has received little or no attention in the research literature.

Theoretical Framework

There have been a number of theoretical frames applied to explain the functioning and effectiveness of teams, including *developmental stages* (Tuckman, 1965), *punctuated equilibrium* (Gersick, 1988), *social exchange theory* (Hollender, 1978), and *process structuration theory* (Giddens, 1984). One theoretical model, the *Ginnett's Team Effectiveness Leadership Model* or TELM (Ginnett, 1996; Hughes, Ginnett, & Curphy, 2002), has been developed specifically to examine the variables impacting team effectiveness in a business context. Figure 1 provides a diagram adapted from the TELM model.

Based on the work of Richard Hackman (1990) and refined through field research at the Center for Creative Leadership, the TELM model uses a general systems theory approach in the study of teams. In a simplified version

of Ginnett's (1996) model, individual, team, and organizational factors identified as inputs to the system are displayed on the left in Figure 1. Process or throughputs (i.e. what one can tell about the team by actually observing the team members at work) occupy the center of the model; and outputs (i.e. how well the team did in accomplishing its objectives) are shown on the right side of the figure. In this model, team leadership establishes the vision (or "dream") for the work, guides the design function, and attends to development issues related to skills and process.

In this case study, we limit our focus on only those factors in the model that our experience can illuminate: two input factors (*team design* factors and *individual inputs*) and team *process* factors. These three areas are highlighted in bold in Figure 1 to illustrate the focus of our inquiry. The reasons for this limited focus are twofold. First, the organization inputs for a volunteer team of this nature were minimal. We had no organizationally sponsored control systems, including reward, education, or information systems other than international dialing access for teleconference calls. Five core members of the steering group and the Future Search facilitator who assisted them were geographically dispersed volunteers, including one member located in London; three other steering group members worked directly or indirectly for ASTD in the Washington, D. C. area. The six unpaid volunteers contributed more than two-thirds of the time, effort, and energy that resulted in a successful conference. Team leadership came from within the volunteer membership of the team and was not an organizationally assigned function.

Second, this is an exploration of process, individual, and team design factors that contribute to effectiveness rather than a study of team outcomes (the team "outputs" of the model). We take the effectiveness of the team to be an outcome achieved only in part, since the work of the Future Search conference is still ongoing. Conference attendees have been invited to participate in an extension of the dialogue that was begun in Orlando through online forums, and work is currently being undertaken to use the conference outcomes in the development of a book and other published materials. Instead, we focus here on factors that contributed to success in planning the Future Search conference in a virtual environment in which Email and teleconferences were our primary modes of communication.

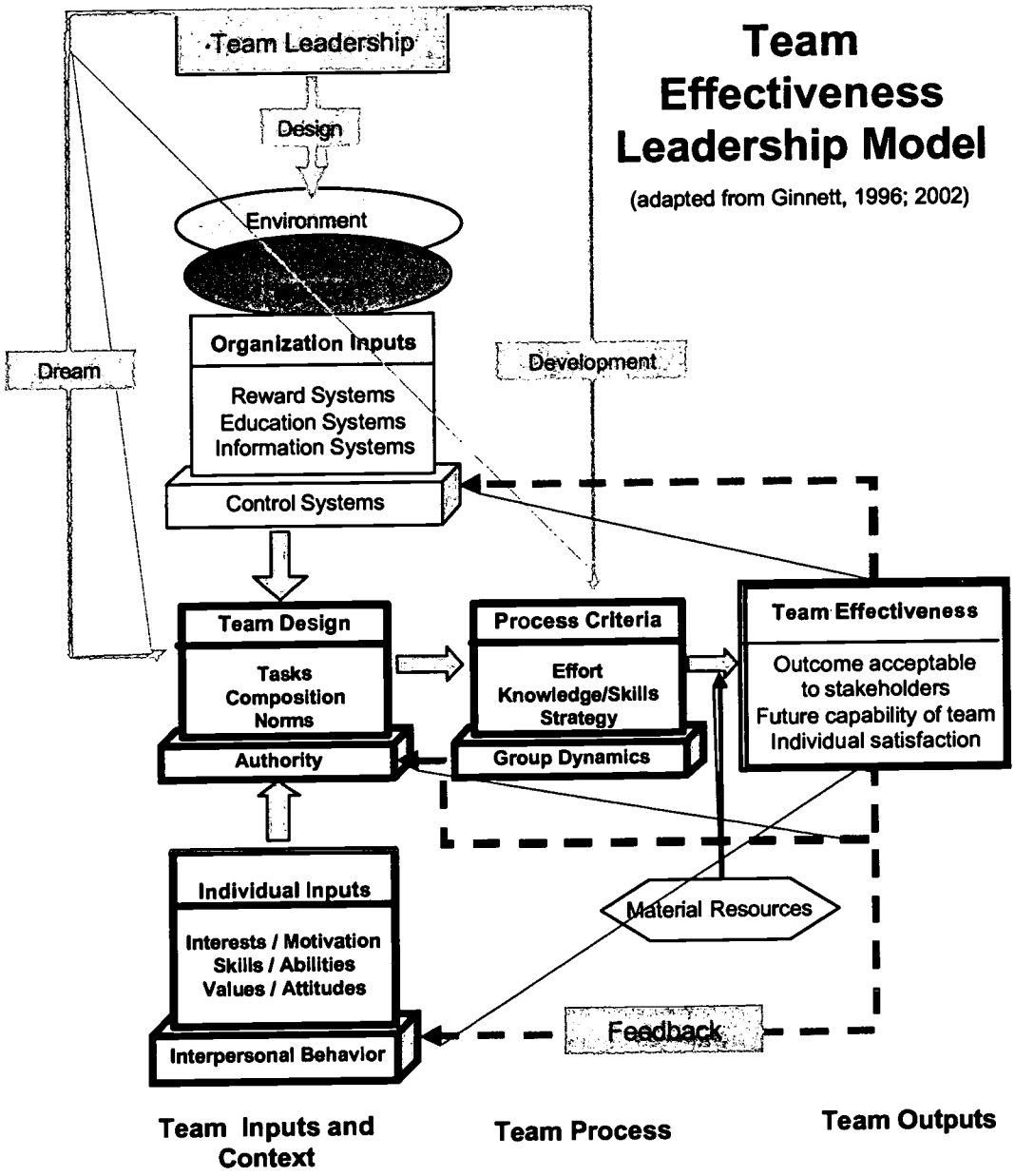
One role of case studies is to test theory (Yin, 1994). The purpose of this exploratory study was to compare and contrast the experiences of the Future Search Steering Group to specific aspects of the TELM, using the model as a theoretical guide. Our goal was to draw some prescriptive lessons that can be applied by volunteer groups working in a virtual environment in the future. The study was guided by the following research questions:

- How did the experiences of the Future Search Steering Group fit with the TELM?
- How did team design, individual inputs, and process factors contribute to team effectiveness?

Methodology

Most case studies rely on multiple methods of data collection to ensure validity and reliability (Creswell, 1998). Two types of data were collected from the nine members of the FSSG during two months that followed the conference planning. Telephone interviews, lasting approximately one hour, covered the following: (a) the process of what makes a virtual planning experience successful; (b) individual factors contributing to motivation and commitment to participate in virtual planning; (c) team design factors, including leadership aspects of virtual collaboration; and (d) perceptions of group-level (collective) learning processes. All interviews were conducted by the same researcher, one of the paper's authors. Each team member was asked 13 open-ended questions, followed by probing questions for clarification, when necessary. All conversations were taped and professionally transcribed, resulting in 75 single-space pages of data.

Figure 1.Team Effectiveness Leadership Model



The FSSG members also completed ITAP International's Global Team Process Questionnaire (GTPQ), a diagnostic instrument designed to help teams improve their effectiveness and productivity (Bing, 2001). As with all teams who use the instrument, this version of the GTPQ was customized for use with the FSSG. The instrument consisted of 19 close-ended items assessing such factors as equality of work distribution, clarity of team objectives, group communications, trust, conflict resolution, and leadership. Each item included a section for additional comments. The GTPQ questionnaire has been thoroughly tested for reliability and validity with global teams in the pharmaceutical, consumer products, and information technology fields for more than five years. For purposes of the questionnaire, a global team is one with members located in more than one country or one that has members from more than one country temporarily working in the same location (Bing, 2001). Mean scores were obtained for the GTPQ close-ended items. Transcriptions of the taped telephone interviews and open-ended comments from the GTPQ were content analyzed for overriding themes by the paper co-authors.

Results and Findings

Four major themes emerged from the interviews and open-ended comments on the GTPQ within this virtual, geographically dispersed team: (a) the importance of energizing and highly effective leadership; (b) intrinsic rewards that motivated individuals; (c) the necessity of a trustful environment, and (d) specific "enabling" virtual communication techniques and protocols. These will be described and related to three aspects of the TELM: team design, individual input factors, and process criteria.

Team Design Factors

Team design factors relevant to the TELM model included a narrowly focused task (organize a Future Search conference with 64 key leaders in the field of HRD); a tight deadline (four months); and volunteer FSSG team membership from within ASTD's Research-to-Practice committee. The nine-member FSSG team was composed of five core members, one volunteer facilitator from outside the ranks of ASTD, two ASTD research officers in liaison roles, and one member in an ASTD administrative role. A clear line of "authority" in the form of team commitment to the success of the project for ASTD and AHRD existed, although the sponsoring organizations exerted little, if any, formal control mechanisms.

Of these design factors, the *volunteer composition* and the *energizing and shared leadership within the team* were credited with successful completion of the task. At first blush, the volunteer nature of the team appeared happenstance, with one member noting that "when we put the team together we gave no real consideration to the relative strength or the working styles of the individuals." However, interviews revealed subtle self-selection criteria among those who volunteered: (a) keen interest in an intellectually stimulating project; (b) desire to contribute to the field of HRD; and (c) desire to enhance working relationships with valued colleagues.

Team members reflected on what kept them going as the project grew in size and intensity, with some spending as much as 20 hours a week outside of their regular jobs at the peak of activity. Working with respected colleagues was a key factor: "I've been more motivated by the chance to work with [team members] than I have the thought of we're going to put a fantastic book out ... I get a lot from the relationships ... on the steering group."

This desire to work with "a finely tuned team of professionals" was, for many, a compelling reason to join the FSSG, but all acknowledged that what maintained the team's momentum was energizing and highly effective leadership, a role that was shared by several team members. Eady on in the project, the member who had volunteered to lead the team began clustering various tasks into "blocks" of work; team members volunteered to spearhead a block of work and were called "blockheads," a term that was one of the group's many inside jokes. Dividing up the task and then monitoring the resulting progress became a coordinating leadership role that was essential to effective team management. Team members agreed, however, that leadership actions were dispersed, with the informal leadership role within the group assumed primarily by another member of the team. Instead of vying for competing roles, team members welcomed others' leadership efforts and attributed this to the volunteer nature of the team:

> [G]iven the nature of the project and the fact that we're all volunteers, I think you've got to have somebody who's pushing it forward all the time ... we each divide up the work and take on difference components but [team member A] invariably will jump in and do a little bit just to shove it along ... it always seems to be good stuff and it tends to make you think and keep pushing a little harder yourself.

Individual Factors

While *energizing and shared leadership* and the *volunteer nature of the team* were deemed essential team design factors, individual input factors also contributed heavily to successful task completion. The TELM model considers interpersonal behaviors as the foundation for individual inputs and a direct function of team members' interests, motivations, skills, abilities, values, and attitudes. For the members of this virtual team, individual factors provided *intrinsic rewards* and created a *trusting environment* that made success possible.

One of the GTPQ questions specifically asked about the equitable distribution of such intangibles as participation, project visibility, authorship of the book, and editorship of papers and conference articles--all motivational factors in the minds of team members. Most team members agreed that everyone had an opportunity to contribute in areas that interested them--"everyone gets a piece of the action"-- while one member noted "it's not an issue of trying to be greedy and hog all the glory (none of us has time for it!) ... [but] I think some of us have more visibility in certain areas ... this is a high-stakes issue because a book authorship is an extremely tangible professional accomplishment." Learning about the Future Search methodology (Weisbord, 1992; Weisbord & Janoff, 2000) and learning about teamwork in a virtual environment were motivating factors, as well:

> I've also learned how an ongoing virtual conversation ... can contribute to collective efforts that far exceed what any one individual can do ... this has been a tremendous learning, for my experience in face-to-face task forces and group efforts had led me to believe that a few people usually do all or most of the work. Here the work was truly shared according to each person's ability to contribute.

An attitude of respect for professional colleagues permeated the virtual experience for team members. Each had an opportunity to contribute his or her own special interests and talents, and each trusted that others would see their portion of the work through to completion. The ability to do high-quality individual work that was then brought back to the team for discussion was a repeatedly mentioned theme: "For a project of this complexity to work, you've got to have people on the team that can run with whatever their passion is ... for the team to disperse and people to be doing their thing and bring it back and let the team crunch on it."

Good written and oral communication skills proved essential in a virtual conversation. Clearly, members realized that it was important that they make allowances for different modes of individual expression and create what one called an attitude of "slack": "There's something around creating slack ...Giving people the benefit of the doubt when they appear to be on your territory or saying something that's negative." Thus, motivated by an opportunity to work with respected colleagues, to share in tangible outcomes according to each team member's interests and abilities, and to learn from one another created the necessary trust for virtual collaboration.

Process Criteria

In addition to team design and individual inputs, our lessons learned came from many process factors, some of which we stumbled into and others that we created intentionally. The TELM model considers process criteria to be the effort expended, the knowledge and skills brought to bear, the planned strategy or techniques adopted, and the group dynamics that emerge from collective action.

Pre-existing relationships among the Research-to-Practice committee members that had been established in a face-to-face environment proved essential to commitment in a virtual one. Telephone conferences added the emotion of tone and voice to messages exchanged electronically, and, most importantly, humor created and sustained a shared group culture that grew through the weeks of conference preparation. One member referred to the "lubricant of a keen sense of humor" and noted that it was hard to get tense in a flurry of metaphors and one-liners. "I think the teleconferences ... help glue things together for us. They re-establish ...you can hear the chuckle that goes with the joke." Without the pre-existing relationships, most doubted that the team would have been able to collaborate so easily and with such clarity.

All acknowledged that more was shared in this team culture than the occasional humorous remark that lightened the workload: Each team member's commitment to the task and to the other members functioned to prop up the group as a whole and maintained a "high level of intensity" without a long lag time between virtual meetings or E-mail exchanges. Emails were characterized as "rapid fire." No sooner did a message go out than a flurry of responses picked up the dialogue exchange. While conducive to capturing the flavor of real-time conversation, this also proved disconcerting at times for our London colleague:

> Every now and then I'd go to bed at ten o'clock which is five Eastern [time] having checked all my E-mails and being up to date and while I'm asleep dialogue is taking place in North America ... And I wake up the following morning ... and see that the dialogue has changed quite drastically as a result of ten different E-mails going back and forth ... I sit there and say, "I've missed this. I feel like I've got to take them back a step in order to say what I would have said..."

It was in this process area that we also recognized our most serious shortfalls. In the world of virtual teams, we were decidedly low-tech, relying heavily on E-mail and teleconferences as our primary communication mechanisms. In retrospect, all acknowledged that we could have benefited greatly by using an electronic bulletin board or some form of virtual collaboration software, such as WebEx® that provides chat rooms for synchronous conversations. The deluge of E-mail traffic was overwhelming at times: "It was tough to stay on top of them. If you took a few days off and didn't have E-mail access and you suddenly came back, you were 30 to 60 E-mails behind."

Many of the process techniques we adopted became enabling structures and protocols that evolved over time as we worked together in a virtual environment. We discovered that a pre-set agenda, sent out by E-mail the day before a teleconference, was essential to effective time management. Not only did it allow the blockheads to summarize their work ahead of time for all to read in advance, but also team members were able to pose questions for the group to consider before a scheduled call. This process allowed us to tackle a sizable number of items in an hour and a half teleconference and come to resolution on them. Dates and times for the calls were set after posing alternatives and letting the group decide on those most convenient for everyone, as opposed to a time that was established by team leadership. Teleconference calls were also planned well in advance for scheduling purposes. During the call, the formal team leader kept notes on actions agreed upon during the call, placing them right into the text of the agenda in bold highlighted text. Within minutes after completion of a teleconference, the team leader sent out a revised copy of the agenda by E-mail with the actions agreed upon highlighted. This allowed anyone who missed a call to be quickly brought up to date.

Overall, team members credit advance organization, pre-planned and electronically distributed agendas, follow-up agendas annotated with action items sent immediately after a teleconference and a lively and active interchange of E-mail dialogue as processes that enabled them to reach their goals. These enabling protocols, however, were only mechanical processes. Individual attributes, skills and abilities, shared commitment, and desire to contribute to the field provided the relational processes of virtual collaboration, and they proved to be as essential as any mechanical techniques.

Discussion

When we examine our first research question about how our experiences in virtual collaboration compare with the TELM model of team effectiveness (Ginnett, 1996; Hughes et al., 1999), we find that the three elements of team design, individual inputs, and process criteria were all essential to successful task completion. Each element functioned similarly to the model's basic design: individual inputs contributed to team design, which, in turn, affected the process criteria of effort, knowledge, skills, and strategy. These process criteria were supported by highly effective group dynamics within the team.

In contrast to the model were our experiences in organizational input factors. As a volunteer group, we came from many different organizations within both public and private sectors, and we were largely a self-directed and self-supported team. The TELM control system factors, such as reward systems, educational, and informational systems that comprise the usual organizational inputs, were missing from our collective experiences. However, we all understood that ASTD and AHRD had specific expectations for sponsoring the Future Search Conference and we acknowledged collective responsibility for delivering results that would be deemed worthwhile. In addition, ASTD provided the funds to support the conference and the administrative resources to ensure its logistical success. One of our team's members was heavily involved in administrative staff support on behalf of ASTD and two others provided key roles as ASTD research officers. Without their sponsorship, the team would not have been able to function as effectively as it did to ensure a successful conference outcome.

Our second research question asked about the respective contributions of team design, individual inputs, and process factors to team effectiveness. Among team design factors, we found that a clearly defined task with a short time frame for task completion and a high stakes outcome created compelling momentum for this virtual team. Volunteer membership permitted self-selection based on individual interests, motivations, and personal desires for professional recognition and contributions. Norms, developed through membership in ASTD's Research-to-Practice committee, already existed, and we were able to build on them, creating a shared vocabulary that formed the basis

for many humorous exchanges that lightened the workload and alleviated tension. This, in turn, sustained a healthy team culture.

The most important of individual inputs that contributed to effectiveness were team members' *shared motivations* to participate in the effort. Collectively, we were motivated by opportunities to work with respected colleagues, to enhance academic publishing in a variety of forums (e.g., book chapter authorship, conference presentations), and to contribute to the field of HRD in a meaningful way. We believe that the importance of shared motivations in accomplishing our task cannot be under-estimated. Shared motivations created a powerful synergy among team members and encouraged individuals to contribute specific skills and abilities, including leadership talents. They formed the basis of a trusting team environment.

Among the process criteria that contributed to our effectiveness as a team, we believe that the combination of individual talents, knowledge, and skills resulted in a team culture with well-established, effective group dynamics. Team leadership was an important aspect of our group dynamics. With *prior knowledge* of the specific strengths and potential contributions from various members, team leadership (both formal and informal) designed strategy to utilize team member strengths fully. Shared leadership was also effective in dispersing effort among team members, so that no one individual carried the whole load.

Conclusions and Recommendations

When Future Search methodology was adopted for strategic planning to explore the future of workplace learning and performance, volunteers in ASTD's Research-to-Practice committee had little virtual team experience in collaboration. The tight four-month time frame for organizing the conference meant that team members had to jump into the process without much pre-planning. We used the tools that each of us had readily accessible: electronic communication via E-mail and the telephone for conference calls.

Instead of the organizational reward systems typically used to enhance motivation and encourage productivity, we had our own personal interests and the support of two professional organizations that we were all committed to seeing successful in their endeavors. We saw the Future Search planning project as an opportunity to work with respected colleagues, to enhance professional relationships, to involve ourselves in an intellectually exciting learning endeavor, and to collaborate in publishing conference outcomes. These individual factors proved to be powerful motivators. They shaped the team design as a configuration of equals and gave rise to our collaborative processes. As a result, we spent more than 1,300 hours outside of our regular jobs to accomplish our task, often working late at night or early in the morning. We exchanged more than 2,000 E-mails and gobbled up more than 17 megabytes of hard drive space on each of nine computers. We experienced the frustration of a barrage of E-mail traffic that often appeared when we had the least amount of time to deal with it. With the completion of the conference event, our work was deemed successful by our sponsoring organizations. It continues to provide the organizing framework for ASTD and AHRD efforts to shape the future of workplace learning and performance.

What would we do differently next time? Certainly, more sophisticated tools for virtual collaboration exist; we regret that we did not pursue them early in our organizing processes, for they would have undoubtedly enhanced the online nature of our dialogue, saved hard drive space, and avoided E-mail overload.

What would we recommend repeating in future virtual collaborations? Volunteer membership, strong and respected leadership dispersed among team members, shared personal motivations for success, and organizing techniques such as pre-planned agendas and post-conference call summaries. Most importantly, our first-hand personal knowledge of each other allowed us to build upon our relationships when relying on virtual methods.

Contribution to New Knowledge in HRD

In an increasingly global world, organizations are likely to use advanced communication techniques to create groups that work in virtual time and space. This case study provides evidence that, in spite of today's technologically sophisticated means for virtual collaboration, human relationships are essential for effectiveness in a geographically dispersed team. Face-to-face relationships sustained our diversity in experiences, perspectives, and written and oral communication styles. Organizations need to consider how to provide a time and place to establish such relationships, or, conversely, how to take advantage of existing interpersonal relationships when establishing virtual teams. Our experience has taught us that relationships among virtual team members are essential for successful outcomes.

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