Angel Silva, DBA, MAOL, CRA, MultiCare Institute for Research and Innovation, participated in the First Cohort of the Author Fellowship program. Angela's peer advisor was Alicen Nickson, MA(hons), MBA, MSc. Deputy Director, Research Support and Development, Brunel University, London, UK

Research Administration Organizations: Results from an Investigation into the Five Disciplines

Angela J. Silva, DBA, MAOL, CRA
MultiCare Institute for Research and Innovation

Abstract: *Research organizations are dealing with impacts from shrinking funding, have limited means and are functioning in environments of constant change and pressure all while identifying resources to develop or sustain programs. This state of uncertainty presents a unique opportunity for organizations to expand their capacity and become adaptive, flexible, and productive learning organizations. The purpose of this study was to determine if research organizations use Senge's Five Disciplines model and how they integrated these disciplines into their organizational culture. Introduced in the 1990's, Senge's model includes key components such as personal mastery, mental models, team learning, shared vision, and systems thinking. Businesses and other organizations that adopt this model tend to be more reflective, adaptive and proactive in addressing changes. A two-phase survey project was conducted and qualitative and quantitative data were collected and analyzed. Results from this project indicate many research administrators had some familiarity with the components of the Five Disciplines model, while others were consciously applying specific components, especially shared vision and systems thinking. In addition, many respondents indicated that although there was strong leadership in their organizations, they were lacking on-the-job learning opportunities, education, and growth. Based on this investigation, recommendations are offered for performing a learning organization assessment, building a shared vision, promoting a culture of learning, and integrating systems thinking. Suggestions for areas of future research are also presented.*

Keywords: *Senge, Five Disciplines, Personal Mastery, Mental Models, Team Learning, Shared Vision, Systems Thinking, Learning Organization, Research Administration, Dimensions of Learning Organization Questionnaire*

Introduction

A variety of organizations conduct research including universities, academic medical centers, community hospitals, federal and state facilities, and for-profit and nonprofit institutions. In some institutions, research is the primary mission, while in others, it is only a part of the overall organizational goal. Underpinning this activity are individuals working in a wide range of positions providing specialized expertise in professional and administrative roles.

Research administration (RA) has emerged as a relatively new professional field with primary emphases on proposal development, award management, and accounting. Professional development through training, certifications and networking opportunities is provided by a variety of research administration organizations such as the Society of Research Administrators International (SRAI), the National Council of University Research Administrators (NCURA), the National Organization of Research Development Professionals (NORDP), and the Research Administrators Certification Council (RACC). Universities such as Johns Hopkins and the University of Central Florida offer Master's degree programs in Research Administration.

Although their profession is becoming more established, research administrators are increasingly operating under conditions of change and uncertainty. Many research organizations are experiencing reductions in programs and staff due, in part, to shrinking sponsoring agency budgets and increased competition for diminishing resources. As scientific research continues to evolve, universities have tried to adapt, with varying degrees of success (Lintz, 2008). As a community, research administrators face increasing responsibilities and are expressing concerns related to work stress, number of hours worked, work/family conflict, and illness (Shambrook, 2012). Effectively managing change and positioning research organizations for success requires proven strategies to build resilience and deliver results.

There are a myriad of management theories and approaches in the organizational management literature. Some of these have been tried and tested, and others were only popular for a short time. Peter Senge's Five Disciplines model first emerged in the 1990's and was widely adopted within the business, higher education, and healthcare sectors. Components of the model include personal mastery, mental models, team learning, shared vision, and systems thinking. This model provides a matrix for organizations to enhance their performance and create vibrant, adaptive, healthy, team-focused environments. The model also presents a pathway for organizations to move from the status quo towards a learning organization that is better able to deal with uncertainty and change. The model is often presented as a framework for organizational development (Bui & Baruch, 2010).

The purpose of this study was to explore the level of awareness of the Five Disciplines model amongst RA communities, and the extent to which this model was being used as a management strategy by a diverse range of research organizations (universities, academic medical centers, community hospitals, federal and state facilities, and for-profit and nonprofit institutions). The two-phase study was driven by three research questions:

RQ 1: To what extent do research organizations use the Five Disciplines model in their development as learning organizations?

RQ 2: How do the key trends or themes mentioned by members of the research organizations help explain their views on the Five Disciplines model?

RQ 3: What attitudes or perceptions of the Five Disciplines model (as expressed by organization members) exist within these organizations?

In the pilot phase, a survey and two exploratory interviews were conducted to gather specific background information from research administrators. Phase II of the project was a thorough assessment of learning organization culture to identify organizational strengths and weaknesses. This more in-depth phase specifically targeted the Five Disciplines model and its application to research organizations.

This article highlights the results of the two-phased research project and, based on the findings, a number of recommendations that can be enacted within research organizations to improve performance are presented.

Literature Review

One of the first organizational management theories was the Great Man theory, introduced in the early 1900s. This theory suggested that great people, and only great people, possessed leadership traits with which they were born (Cawthron, 1996). In the early 20th century, as industrialization was sweeping the nation, Taylorism emerged as the popular management theory conceptualizing employees as machines to be managed within a production line model (Koumparoulis & Vlachopoulioto, 2012).

In the 1970s and 1980s, modern leadership theory was influenced by scholars including Drucker, Bennis, and Covey. There was a clear shift from the view of employees as machines, to the importance of organizational performance and culture, and employee productivity. Drucker's interests were related to organizational performance, creating an ideal environment, and developing a culture to support the creation of knowledge and the sharing and retention of this knowledge (Key, McCann, & Thompson, 2009). Bennis viewed organizations as organic systems and studied the intricacies and dynamics of successful leadership. According to Bennis (1999), "if there is one generalization we make about leadership and change, it is this: no change can occur without willing and committed followers." Covey was passionate about teaching leaders and employees how to be more effective in the workplace and may be best known for his book, *The Seven Habits of Highly Effective People*. Commentators have also sought to improve understanding of what successful leadership is and how it impacts organizations. The notion of servant-as-leader was introduced by Greenleaf in the 1970s. Servant leadership focuses on the leader as one who makes a deliberate choice to serve others and put the needs of others above their own (Sendjaya & Sarros, 2002).

In 1990, Senge introduced the concepts of the Five Disciplines. These concepts are central to creating a learning organization and encouraged groups of people to work together toward a common goal in order to excel and improve their individual and overall organizational

performance. They have been widely adopted by businesses and are still used today. The Five Disciplines concepts include:

1. Personal mastery (encourages personal growth and learning)

2. Mental models (our personal generalizations and assumptions)

3. Team learning (letting go of preconceived ideas and assumptions and working together)

4. Shared vision (building a shared picture of the future)

5. Systems thinking (encourages contemplating the whole, not the individual parts of a system)

Several researchers have sought to apply management theories relating to organizational leadership to the field of RA. Lintz (2008) recognized that research administrators tend to be reactive, rather than forward thinking, when they are responding to requests, reviewing proposals and contracts, and solving problems as they arise. Lintz presented a conceptual framework outlining effective management principals as a model for research administrators to adopt. This framework provides research administrators with strategic options to lead institutions in a highly competitive research environment. Gannon (2011) surveyed 121 research administrators on their perceptions of the academic medical center as a learning community. Results from the survey showed that an academic medical center is a learning organization but the learning environment could be strengthened. Campo (2014) described leadership as it relates to the field of RA, and claimed that every person in an organization is in a position to lead, regardless of job title or supervisory status. Gabriele & Caines (2014) explored servant leadership, leadership, and culture as related to RA, and presented the concept of "LeaderBeing." They challenged research administrators to avoid getting caught up in valuing only the work that needs to be done, and instead mature as a servant leader by becoming more involved in deepening one's personal and professional character.

While the literature clearly showed that management and leadership concepts were thriving in the business sector, there was little evidence that the Five Disciplines model has been used within research organizations. Given the benefits derived from the application of other management models to research administration, it was also clear that research organizations could benefit from these learning organization concepts.

Materials and Methods

The aim of this project was to determine the extent to which research organizations use the Five Disciplines model and how they adapt these disciplines into their organizational culture. There might be formal adoption of the model (employment of the five disciplines) or informal influence (incorporating components of the five disciplines into organizational culture).

The author received approval from the California Intercontinental University Institutional Review Board to conduct a two-phase study, collecting data from research administrators via survey and interviews. An exploratory sequential design was used for this project. This research design allowed the investigator to first explore participant's views (qualitative phase) and conclude with analyzing and interpreting the data from the surveys (quantitative phase). The pilot

phase evaluated research administrators' understanding of the Five Disciplines model through introductory survey questions and questions in the Dimensions of the Learning Organization Questionnaire (DLOQ) instrument. Two interviews were also conducted to identify use of the Five Disciplines components in research organizations (RQ 1). In phase II of the project, the short form of the DLOQ was used to identify key trends or themes and evaluate attitudes or perceptions of the Five Disciplines model (RQ 2 and RQ 3).

Pilot Phase

In the pilot phase of the study, data were collected through an online survey, two phone interviews, and the scientifically validated DLOQ questionnaire. The DLOQ was developed by Marsick and Watkins in 1993 and provides a thorough assessment of organizational learning culture and is available in both short and long form versions. It has been used with more than 200 companies (Marsick & Watkins, 2003). In this phase, the full DLOQ instrument was administered (55 questions) to gather information on organizational learning culture.

The pilot survey included questions about respondent demographics and captured information on research administrators' familiarity with the components of the Five Disciplines model and if they use this approach in their day-to-day work. The researcher developed these questions specifically for this study, and validity and reliability have not been tested. However, the questions were designed to be clear and direct to avoid ambiguity.

The pilot survey was distributed to a closed population of 3,858 research administrators who subscribed to the Research Administration Listserv. The survey was open from March 12, 2015 to May 19, 2015.

Two phone interviews were also conducted with staff from research organizations to explore their familiarity with the Five Disciplines model. A request for volunteers was posted during the pilot phase of this project. Interviewees were selected from those respondents that expressed interest. The first interviewee was a research administrator from a nonprofit with 14 years of experience, and the second was a research administrator from a university who had been in the field for 20 years.

Phase II

Phase II of the study involved the collection of data on research administrators' views related to organizational learning culture. To avoid survey fatigue and encourage more responses, an abbreviated version of the DLOQ was sent out to a broader audience of research administrators. Social media platforms were also utilized to further extend the reach to potential participants.

The phase II survey was open from May 3, 2015, to July 10, 2015 with 609 people participating. The abbreviated DLOQ survey was widely distributed through various listservs, discussion groups, emails, and social media. The estimated population at the time of the survey was 94,757 as represented in Table 1.

Table 1. Estimated Membership Counts of Research Administration Groups

Group	Distribution Methods	Phase	Estimated Members
RAL	Listserv	Pilot & Phase II	3,858
AUTM	Discussion group	Phase II	1,032
SRAI	Email, Linkedin, Facebook	Phase II	8,734
NCURA	Linkedin, Facebook	Phase II	5,450
RACC	Linkedin	Phase II	126
NORDP	Linkedin	Phase II	933
RAN	Linkedin	Phase II	1,314
ACRP	Linkedin	Phase II	54,768
GW	Linkedin	Phase II	16,291
InfoEd	Listserv, Email, Twitter	Phase II	1,052
OTHR	Facebook, Email	Phase II	1,199
Notes: The total pilot contained 3,858 members. Phase II contained 94,757 members			

The population was estimated from the social media and listserv membership counts. Duplicate memberships were not accounted for. Membership numbers and social media followers were used to estimate the population.

Data Collection and Analysis

For the pilot and phase II surveys, data were collected through SurveyMonkey and exported to Excel. After the conclusion of each phase of the project, data were extracted from the online survey database, de-identified, and quantified in aggregate.

In this two-phased project, both qualitative and quantitative data were analyzed. Qualitative data were based on research administrators' responses to the introductory section of the pilot survey, indicating their awareness of and familiarity with the Five Disciplines model. Thematic analysis was used to identify themes within their responses and to categorize these themes as related to the components of the Five Disciplines model. In the quantitative data analysis, responses to the DLOQ were tallied through Excel and scored according to the self-scoring instructions. If a response to a survey question was not answered or incomplete, the question was considered inconclusive and excluded from the analysis.

There were five questions in the pilot survey that evaluated research administrators' familiarity with the Five Disciplines model. These questions were developed by the researcher and participants

were encouraged to indicate their level of familiarity with the Five Disciplines concepts. For each of the Five Disciplines concepts, participants were asked to rate their familiarity. The options to select from were *No familiarity*; *Some familiarity*; or *Very Familiar*. They were also asked if they used these concepts in their day-to-day work. These initial questions provided a solid introduction to the DLOQ. To The DLOQ included questions related to individual, team, group, and organizational levels, with the following nine specific rating areas as referenced in Table 2.

Table 2. Question Range and Definitions of the DLOQ Dimensions

Question Range on DLOQ	Dimensions	Definition
1-7	Continuous Learning	• Learning is integrated into work • People can learn on the job • Ongoing education and growth are provided
8-13	Inquiry and Dialogue	• Productive reasoning skills are gained • People express their views. Increased capacity for listening and inquiry • Views of others are encouraged • Organizational culture supports questions, feedback and experimentation
14-19	Collaboration and Team Learning	• At work, groups access different modes of thinking and learn together • Collaboration is appreciated and rewarded
20-25	Systems to Capture Learning	• Hi-tech and low-tech systems are used to share learning and integrate work
26-31	Empower People	• People work together to develop, own, and implement a joint vision • People are motivated to learn and are accountable for what they do

32-37	Connect the Organization	• People see the effect of their work on the entire organization and use information to adapt work practices. The organization is linked to the community
38-43	Provide Strategic Leadership for Learning	• Leaders model and champion learning. Learning is used strategically for business results
44-49	Financial Performance	• Indicates financial health and available resources
50-55	Knowledge Performance	• Products and services are enhanced because of learning and knowledge capacity • Indicates intellectual capital

Note: Table adapted from Leufvén, M., et al. (2015).

An analysis was then conducted to show the distinction between the responses to each of the nine DLOQ Dimensions.

Exploratory interviews occurred by phone in the pilot phase. The purpose of these 15-minute interviews was to get a sense of how research administrators used one or more of the Five Disciplines model components in their organizations to develop a learning organization culture. This helped to inform the overall results of the study by providing examples of how the components of the Five Disciplines were used in a RA setting.

In order to increase the response rate and lessen the time survey respondents needed to take the survey, the short form of the DLOQ was used. The short form is a validated tool that has been used successfully with other organizations. In phase II, the short form of the DLOQ was administered through SurveyMonkey. The shortened survey contains 21 questions and represents the areas of *Continuous Learning, Inquiry and Dialogue, Collaboration and Team Learning, Systems to Capture Learning, Empower People, Connect the Organization, and Provide Strategic Leadership for Learning*. Responses were exported to Excel and the univariate frequency of distributions was also measured to show the distinction between the responses to each of these areas. Unclear or incomplete survey responses were excluded from the data analysis.

Fisher's Exact Test and the Cochran-Armitage statistical tests were used to identify the association between responses to the demographic questions from the pilot and phase II surveys. These tests were completed using an online statistical calculator and XLSTAT. XLSTAT is an easy to use Excel add-in and provides basic statistical analysis (Deal, 2001).

Validity and Reliability

The DLOQ was the primary instrument used in this investigation. This tool has been determined to be valid and consistently reliable above the recommended .70 rating (Marsick & Watkins, 2003). The short form of the DLOQ survey has also proven to be reliable with an overall reliability estimate of .93 (Yang, 2003).

Sample Size

The pilot survey was open for just over three months and was distributed to 3,858 subscribers to the Research Administration Listserv. Only 168 people consented to take this survey, falling far short of the sample size of 350 recommended by Raosoft's online sample size calculator. RAO provides many online tools to support questionnaire design, graphics and data analysis an integrated questionnaire (Arora, 1994). The population pool was expanded significantly for the phase II survey, with a recommended sample size of 383 respondents using Raosoft's online calculator.

Results

Pilot Phase

In the pilot phase, 168 responses were received from the surveyed population (3,858), which indicated a 4% response rate. Most respondents were female (92.2%), white (88%) and had a graduate-level education (47.24%). Most responses were received from participants aged 35-44 (35.5%). The reported areas of highest general responsibility included pre-award (33.1%) and pre- and post-award management (33.7%). Most respondents worked in a university setting (68.32%) with 1,001 to 10,000 employees (47.9%) and were in the area of middle management (35.2%). They also spent 1-10 hours per month outside of work on work-related learning (77.9%).

Most participants had some familiarity with components of the Five Disciplines model but were least familiar with mental models. This is represented in Table 3.

Table 3. Familiarity with Senge's Five Disciplines Questions

Question	Response	n	%
Familiarity w/systems thinking	None	39	25.50
	Some	80	52.30
	Very	18	11.80
	Use day to day	16	10.50
Familiarity w/personal mastery	None	37	24.30
	Some	79	52.00
	Very	26	17.10
	Use day to day	190	6.60
Familiarity w/mental models	None	74	48.40
	Some	60	39.20
	Very	16	10.50
	Use day to day	3	2.00
Familiarity w/shared vision	None	27	17.80
	Some	82	53.90
	Very	37	24.30
	Use day to day	6	3.90
Familiarity w/team learning	None	39	25.50
	Some	72	47.10
	Very	35	22.90
	Use day to day	7	4.6

DLOQ

In addition, 120 participants responded to the full DLOQ survey. The highest rated value was *Knowledge Performance* and the lowest rated value was *Systems to Capture Learning* (rating scale 1-6) with (1) being Almost Never and (6) being Almost Always.

1. Continuous Learning = 3.38

2. Inquiry and Dialogue = 3.44

3. Collaboration and Team Learning = 3.06

4. Systems to Capture Learning = 2.16

5. Empower People = 2.97

6. Connect the Organization = 3.37

7. Provide Strategic Leadership for Learning = 3.26

8. Financial Performance = 3.39

9. Knowledge Performance = 3.45

Exploratory Interviews

Two interviews were conducted during the pilot phase of this study. Interviewees shared their familiarity with each of the five disciplines in the model (team learning, shared vision, systems thinking, personal mastery, and mental models). These interviews were short and exploratory and intended to highlight respondent's familiarity with the five disciplines concepts. One question from each of these Five Disciplines areas was posed during the phone interviews: team learning, shared vision and systems thinking.

In the first interview, team learning was highlighted. The interviewee shared that it was important for their small team to be flexible in their approach to their job responsibilities, as downsizing had impacted the organization. It was no longer possible to have a rigid division of responsibilities. Staff needed to assume more responsibilities and complete tasks outside of their usual areas of responsibility. It was important for the team to work together, and they accomplished this through a shared vision. The vision they shared was to work together and make sure the organization was sustainable even though the team was smaller. In addition, systems thinking was valued as the team needed to see the whole picture and be innovative to make things work.

In the second interview, the disciplines of personal mastery and growth were clearly evident when the professional development of department team members was discussed. Team learning was also in practice and was used when a committee with many department and other team members needed to draft a standard operating procedure (SOP) for document management. Overcoming pre-established mental models was also evident during the process of developing this SOP, as no one had a clear idea of what the other team members did. Any preconceived ideas were dismantled as members of this team learned to work together to accomplish this task. Because the team was diverse and committee members had various skills and knowledge, a successful SOP was developed. The organizational culture also supported building a shared vision and connecting team members to the big picture. Team members knew the work that they accomplished helped the faculty get the research done. Team members were asked to consider how they fit within the team and how their work made an impact in the day-to-day tasks that needed to be accomplished.

Phase II Study

The phase II survey was distributed to a broader population of research administrators. In addition to members of the Research Administration listserv, research administrators from the following groups were invited to participate: the Association of University Technology Managers (AUTM), the Society of Research Administrators International (SRAI), the National Council of University Research Administrators (NCURA), the Research Administrators Certification Council (RACC), the National Organization of Research Development Professionals (NORDP), the Research Administrators Network (RAN), the Association of Clinical Research Professionals (ACRP), Grants Writers/Grant Writing (GW), and the InfoEd group. The SurveyMonkey link was distributed through various listservs, discussion groups, emails and social media. The phase II survey started on May 3, 2015 and concluded on July 10, 2015 with 609 responses received,

yielding a 0.6% response rate.

Respondent demographics were similar to those from the pilot survey. The short form of the DLOQ was used and 520 responses were received. The highest-rated area was in Strategic Leadership for Learning and the lowest area was in Continuous Learning.

Of the 609 people who participated in this survey, respondents were predominantly female (84.9%), a result consistent with the field (Shambrook & Roberts, 2011). Most respondents were white (79%) and had graduate-level education (42.18%). Most responses were received from participants aged 45-54 (30.21%). The reported areas of highest general responsibility included pre-award (24.57%) and pre- and post-award management (31.09%). Most participants worked in a university (59.11%) with 1,001 – 10,000 employees (44.25%), and were in the areas of middle management (37.5%). The majority of these respondents also spent 1-10 hours per month outside of work on work-related learning (72.08%).

Overall Results

There were many consistencies between the data collected in the pilot and phase II studies. Overall, the results of the pilot and phase II surveys indicated that participants had some familiarity with the Five Disciplines model and some of these learning organization concepts were evident in their organizational culture.

One key item to note is that respondents were participants in various listservs and email groups and therefore survey responses were limited to this community. The survey was not directed toward particular organizations or groups of research administrators except for those previously referenced. Demographic factors were compared using the Fisher's Exact Test through an online calculator and the Cochran-Armitage Trend test using XLSTAT through an Excel add-in. Areas of significance between data sets include ethnic background and area of general responsibility. There was no significant difference in the areas of gender, education level, age, organizational role, work-related learning, organization type, and number of organizational employees. This is represented in Table 4.

Table 4. Pilot Survey and Phase II Survey Demographics Comparison

Question	Distribution	Pilot n	%	Phase II n	%	P Value
Gender	All	168	100	609	100	0.0179a
	Male	13	7.80	79	15.10	0.053b
	Female	153	92.20	445	84.90	
Ethnic Background	White	146	88	412	79	0.246b
	African American	4	2.40	31	6.00	
	Asian American	4	2.40	19	3.70	
	Latino American	7	4.20	17	3.30	
	Native American	1	0.60	2	0.40	
	Other	4	2.40	22	4.20	
	N/A	0	0	17	3.30	

Education level	High School	0	0	3	0.57	0.006b
	Some College	5	3.07	31	5.92	
	College Degree	57	34.97	176	33.59	
	Graduate	77	47.24	221	42.18	
	Post Graduate	24	14.72	83	15.84	
	Other	11	6.75	10	1.91	
Age	18-24	0	0	0	0.00	0.246b
	25-34	21	12.70	63	12.05	
	35-44	59	35.50	148	28.29	
	45-54	38	22.90	158	30.21	
	55-64	42	25.30	125	23.90	
	65-74	6	3.60	26	4.97	
	75+	0	0	3	0.57	
General Responsibility	Gen Mgt	12	7.40	67	12.86	0.0062b
	Oper	7	4.30	35	6.72	
	Fin/Acct	12	7.40	49	9.40	
	Admin/HR	3	1.80	14	2.69	
	Mark/BD/Comm	1	0.60	6	1.15	
	Technical/R&D	1	0.60	12	2.30	
	Legal	3	1.80	13	2.50	
	Pre	54	33.10	128	24.57	
	Post	15	9.20	35	6.72	
	Pre & Post	55	33.70	162	31.09	
Role	Sr Mgr	31	19.10	91	17.50	0.9146b
	Middle Mgt	57	35.20	195	37.50	
	Supervisory	12	7.40	44	8.46	
	Tech/Prof	55	34	171	32.88	
	Hourly	7	4.30	19	3.65	
Work Related Learning	0 hrs	10	6.10	30	5.74	0.127b
	1-10 hrs	127	77.90	377	72.08	
	11-20 hrs	21	12.90	85	16.25	
	21-35 hrs	1	0.60	17	3.25	
	36 hrs	4	2.50	14	2.68	
Organization Type	University	110	68.32	305	59.11	0.097b
	Academic Med Ctr	14	8.70	52	10.08	
	State	3	1.86	11	2.13	
	Fed	2	1.24	11	2.13	
	Hospital	10	6.21	55	10.66	
	Non-profit	22	13.66	72	13.95	
	For Profit	0	0.00	10	1.94	
	Other	7	4.35	23	4.46	

Number of Organization Employees	0-500	29	17.80	90	17.24	0.321b
	501-1000	18	11.00	51	9.77	
	1,001-10,000	78	47.90	231	44.25	
	10,001-50,000	33	20.20	124	23.75	
	Over 50,000	5	3.10	26	4.98	

Notes: a. Test performed using online Fisher Exact Test calculator (www.socscistatistics.com).
b. Cochran-Armitage Tests performed using XLSTAT

The DLOQ results from the pilot and phase II surveys showed that Continuous Learning (3.38) and Inquiry and Dialogue (3.44) rated highest in the pilot survey while Strategic Leadership (3.86) and Inquiry and Dialogue (3.78) were the highest-rated in the phase II survey. The only similarity in results was in the Inquiry and Dialogue section. This information is presented in Figure 1.
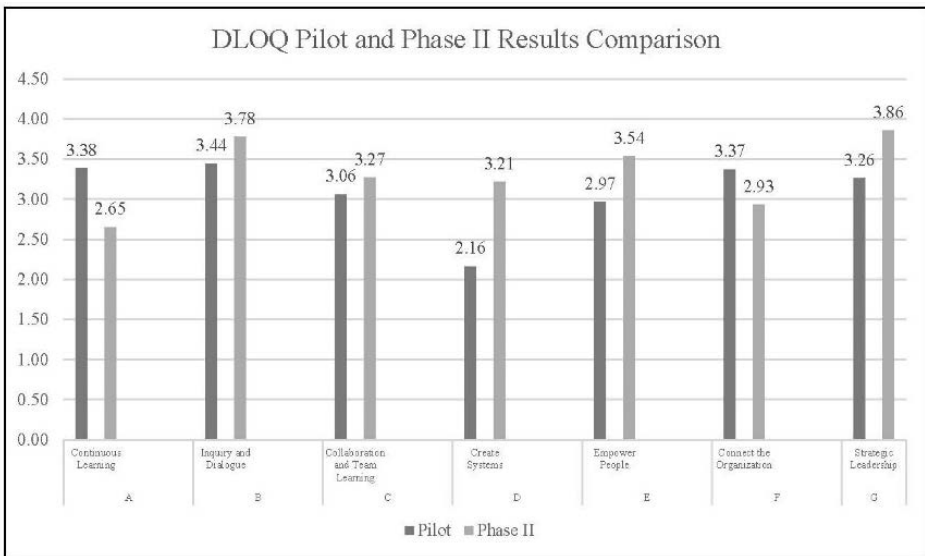
Figure 1. DLOQ Pilot and Phase II Results Comparison

Discussion

The first research question was explored in-depth in the pilot phase and focused on the extent to which research organizations use the Five Disciplines model in their development as learning organizations. For each of the components of the model, respondents could select from the following options: "None" (no familiarity); "Some" (some familiarity); "Very" (very familiar with the specific component); and "Use Day to Day" (daily use of the specific component). Most respondents indicated familiarity with the five disciplines. Overall results include:

1. Systems thinking: Some familiarity = 52.3%

2. Personal mastery: Some familiarity = 52%

3. Mental models: No familiarity = 48.4%

4. Shared vision: Some familiarity = 53.9%

5. Team learning: Some familiarity = 47.1%

The second research question focused on key themes and trends mentioned by research organizations that helped explain their views on the five disciplines model. Results from the DLOQ indicated that Knowledge Performance (rating at 3.45) and Strategic Leadership for Learning (rating at 3.86) were the most highly-rated dimensions.

The third research question was related to the attitudes and perceptions of the Five Disciplines model that exist within research organizations. Cumulative results from the DLOQ indicate that learning is highly valued. The DLOQ was used in the pilot and phase II surveys. To determine overall responses of the RA population, ratings were averaged between the pilot and phase II surveys with Strategic Leadership at 3.56, Collaboration and Team Learning at 3.16 and Continuous Learning at 3.01.

A review of the overall DLOQ scores shows participants indicated that their organizations had strong leadership but were lacking in on-the-job learning opportunities, education, and growth.

Conclusion

This study was the first inquiry related to the Five Disciplines model and the DLOQ instrument in relation to research organizations. This investigation gathered both qualitative and quantitative data. Results from the pilot survey revealed that most participants had some familiarity with each component of the Five Disciplines model, especially shared vision and systems thinking; this was also evident in the case study interviews. Results from the DLOQ surveys identified specific areas of organizational strength and weakness.

Recommendations

Research administration is a constantly evolving profession that is vulnerable to external and internal pressures with research organizations functioning in an environment of constant change and continually shrinking resources. It is clear that effectively managing change will be a constant challenge for research organizations. However, while change can be challenging, there is also opportunity for these organizations to become more adaptive, flexible, and productive learning organizations. Becoming a learning organization is an evolutionary process that begins with engaging employees at every level in the process.

Key recommendations arising from this study include performing a learning organization assessment, building capacity for shared vision, promoting a culture of learning, and integrating systems thinking approaches to develop the Five Disciplines model and promote a learning organization culture. Rationale for these recommendations is based on responses to the DLOQ.

Recommendation 1 - Perform a Learning Organizational Assessment

Research organizations must deal with issues associated with limited funding, increased competition and increased regulatory oversight in a constantly changing and evolving environment. Consequently, there needs to be a method to manage this efficiently and effectively.

Performing a learning organizational assessment is one of the first steps to determine organizational performance and what can be improved. In the literature, it is evident that there is concern that managers may lack practical tools and guidelines to reference when developing a learning organization (Goh, 1998). Adopting a tool to perform an organizational assessment on a team, department, or organization is the first step in identifying strengths and weaknesses in organizational learning culture. Practicing RA leaders and senior administrators can position themselves as champions for an organizational assessment. Determining the "lay of the land" is a critical first step in evaluating past and current practice and identifying gaps that prevent the RA team from achieving synergy and effective overall operations as a learning organization. Those newer to the RA profession can also be effective advocates for an organizational assessment and should ask questions. The five W's (who, what, where, why, when) are simple basic questions that can really flesh out a practice or procedure and help the team get back to basics.

From responses to the DLOQ, Knowledge Performance and Strategic Leadership for Learning were the most highly-rated learning dimensions. Knowledge performance is an indicator of the knowledge capacity of an organization (intellectual capital). A high rating in strategic leadership indicates solid organizational leadership where leaders model and are champions of learning. This is consistent with the literature emphasizing research administrators as thought leaders (Atkinson, Barrett, & Gilleland, 2007) and showing the value of successful leaders (Campo, 2014; Willenberg, 2014). In addition, Campo (2014) advocates that each individual is in a position of leadership in an Office of Sponsored Programs. Results from the DLOQ also highlighted areas of potential improvement include Create Systems and Connect the Organization. Creating systems involves using high and low technology systems to share learnings and integrate work. Connecting the organization relates to people realizing the effect of their work on the organization and environment and adapting as necessary. Cumulative scores were averaged from the pilot and phase II surveys and were 2.68 and 2.73 respectively (see Figure 1).

In summary, the results indicate that research organizations have a strong intellectual capital and leaders that champion learning. But there is a disconnect in using technology to create and integrate work and connecting people to the organizational environment. Adopting an inquisitive approach and conducting a learning organization assessment will help identify what's working well and areas of potential improvement.

Recommendation 2 - Build a Shared Vision

Research administration is a constantly evolving profession and sometimes RAs may experience an identity crisis (Trindale & Agostinho, 2014). The second recommendation based on the findings from this study is to build capacity for shared vision. Participants in the pilot survey indicated that they had the most familiarity with shared vision, rating this component of the Five Disciplines model at 53.9%. Building capacity for shared vision includes providing training for

leaders to learn leadership skills (Campo, 2014), encouraging an environment of dialogue and innovation, and supporting personal growth and development. Leaders and senior administrators should be mindful that building a shared vision is not a top-down strategy and leadership is not exclusive to management level positions. A shared vision should be built with the involvement of the RA community regardless of job title or position. Many RAs demonstrate leadership in their day-to-day work and have gained valuable expertise in their roles. Promoting a culture of inquiry and dialogue will encourage transparency and build trust as the vision is developed. This will also ensure everyone has input and that there is buy-in to put the shared vision into practice.

Building capacity for a shared vision and developing the vision may seem overwhelming or daunting at first. It is important to remember that this is a process with many components and it could take months or even years to complete. One of the advantages of the RA profession is that it is comprised of communities of learners and there are resources available. Professional organizations such as SRAI and NCURA offer advanced leadership training. There is a growing body of RA literature that depicts how other organizations have approached development. Further, there are colleagues at other institutions that may be subject matter experts that could share resources they have developed. An email to one of the many RA listservs could produce some intriguing resources.

Recommendation 3 - Promote a Culture of Learning

A learning organization champions the collective learning process for employees at every level of the organization. Research organizations value learning and encourage continued education. Many research administrators hold a Bachelor's or higher-level degrees (Shambrook & Roberts, 2011). Demographic findings indicate that most participants had graduate-level education. Cumulative results from the DLOQ reflect that learning is highly valued. Building a learning community involves identifying gaps in knowledge, sharing and developing ideas, and learning from mistakes and reflection (Gannon, 2011). Three specific learning dimensions were measured and overall values from the pilot and phase II surveys show that Strategic Leadership was the highest-rated area at 3.56, Collaboration and Team Learning rated at 3.16, and Continuous Learning at 3.01. Continuous Learning is related to on-the-job learning to promote education and growth for individuals. This area was rated high in the pilot phase but was the lowest-rated area in the phase II survey. This seems to suggest some conflicting views among participants and could be an overall area of improvement. This outcome is consistent with over 72% of respondents indicating that they spent 1-10 hours outside of work on work-related learning. To better promote a culture of learning, research organizations should also include on-the-job learning opportunities.

Research administrators are learners. With changing regulations, updated sponsor guidelines, and a flurry of new opportunities to pursue, there is a constant stream of new information to learn and process. Organization and department budgets are shrinking and this often limits resources available to pursue conferences and other professional development opportunities. Leaders and practicing administrators should therefore seek opportunities to promote onsite training and development and also look for local (chapter and regional) training and education opportunities as offered through SRAI and NCURA. In addition, many RA training and education organizations

are in desperate need of volunteers. Volunteering with one of these groups would benefit the individual research administrator and also the organization, as this individual can share what they learned with the RA team.

Recommendation 4 – Integrate Systems Thinking

The last recommendation from this study is for research organizations to better integrate a systems thinking approach. Systems thinking integrates all of the Five Disciplines into the learning organization model. Research administration from a systems perspective involves many interdependent components to include sponsors, people, and processes working together and can promote cooperation, shared responsibility, and improved performance (Kirby, 1996). The results of this study add to the body of research knowledge by validating that systems thinking is one of the most familiar learning organization concepts. In the pilot survey, the highest rated area from the DLOQ was Knowledge Performance, suggesting that most respondents thought their organization had systems to capture and share knowledge. In addition, pilot survey respondents indicated a 52.3% familiarity with systems thinking. While Systems Thinking was highly rated, results from the DLOQ also reflected areas of potential improvement to include Create Systems and Connect the Organization. Cumulative scores from these learning dimensions were averaged from the pilot and phase II surveys and scored 2.68 and 2.73, respectively. Creating Systems involves maintaining and utilizing both high and low technology to share and integrate learning with work while Connecting the Organization is related to connecting people to their environment, adjusting work practices based on information, and linking the organization to communities (Marsick & Watkins, 2003). Improving technology sharing and integration, and ensuring connections between people, their environment, and communities, will improve the systems approach for research organizations. One of the basic first steps for leaders and research administrators to consider when integrating a systems thinking approach is to view the issue, problem, or process from a holistic perspective. Involve the RA team as well as other departments, teams, and individuals in the process. Differing perspectives will help flesh out an issue in-depth and ensure there is investment from all parties for a resolution. Some basic approaches that can be used to facilitate the planning process and problem solving include creating a process map or using a fishbone diagram (Madison, 2005).

Suggestions for Future Research

Directions for future research could involve many other studies. For example, a similar study could be conducted evaluating leadership styles and behavior by type of research organization and how this influences learning organization culture. Additionally, future studies could evaluate if the type of research organization influences how the Five Disciplines model is used. It would also be interesting to evaluate if gender, age, or organizational role influences outcomes. An additional phase of the study could be conducted and include these variables as additional outcomes. Follow-on studies could be conducted to evaluate the rate of success of various research organizations' use of the Five Disciplines model.

Author's Note

Angela J. Silva, DBA, MAOL, CRA
Research Project Manager II
MultiCare Institute for Research & Innovation
314 Martin Luther King Jr. Way, #402
Tacoma, WA 98405
(253) 403-5263
Email: asilva@multicare.org

Correspondence concerning this article should be addressed to Dr. Angela Silva, MultiCare Institute for Research & Innovation, 314 Martin Luther King Jr. Way #402, Tacoma, WA 98405.

References

Arora, R. (1994). Raosoft SURVEY Version 2.0: A productivity database. T*he Journal of Consumer Marketing*, 11(3), 58.

Atkinson, T. N., Barrett, T. G., & Gilleland, D. S. (2007). The dimensions of influence on research administrator behavior: Toward a theoretical model of research administration as a public service profession. *Journal of Research Administration*, 38(1), 55.

Bennis, W. (1999). The end of leadership: Exemplary leadership is impossible without full inclusion, initiatives, and cooperation of followers. *Organizational Dynamics,* 27(1), 71-80. http://dx.doi.org/10.1016/S0090-2616(00)80008-X

Bui, H., & Baruch, Y. (2010). Creating learning organizations: A systems perspective. T*he Learning Organization*, 17(3), 208–227. doi: http://dx.doi.org/10.1108/09696471011034919

Campo, M. (2014). Leadership and research administration. *Research Management Review*, 20(1), 87–93. Retrieved from https://files.eric.ed.gov/fulltext/EJ1038832.pdf

Cawthorn, D. L. (1996). Leadership: the great man theory revisited. *Business Horizons*, 39(3), 1-4. https://doi.org/10.1016/S0007-6813(96)90001-4

Deal, K. (2001). Statistical analysis when you don't need the big guns. *Marketing Research*, 13(2), 48–49.

Gabriele, E. F., & Caines, V. (2014). LeaderBeing: Critical reflections on context, character and challenge in the culture of research and its administration. *Research Management Review*, 20(1), 30. Retrieved from https://files.eric.ed.gov/fulltext/EJ1022034.pdf

Gannon, S. C. (2011). Assessing the academic medical center as a supportive learning community. *Journal of Research Administration*, 42(1), 74.

Goh, S. C. (1998). Toward a learning organization: The strategic building blocks. *SAM Advanced Management Journal*, 63(2), 15-22.

Kirby, W. (1996). Understanding and managing sponsored research administration as a system. *SRA Journal*, 27(3-4), 25.

Koumparoulis, D. N., & Vlachopoulioto, A. (2012). One hundred years of Taylorism: Is it still relevant today? *Academic Research International*, 3(2), 420–426. Retrieved from http://www.savap.org.pk/journals/ARInt./Vol.3(2)/2012(3.2-55).pdf

Leufvén, M., Vitrakoti, R., Bergström, A., Ashish, K. C., & Målqvist, M. (2015). Dimensions of Learning Organizations Questionnaire (DLOQ) in a low-resource health care setting in Nepal. *Health Research Policy and Systems*, 13(1), 6. https://doi.org/10.1186/1478-4505-13-6

Lintz, E. M. (2008). A conceptual framework for the future of successful research administration. J*ournal of Research Administration*, 39(2), 68.

Madison, D. (2005). Process mapping, process improvement, and process management: *A Practical Guide for enhancing work and information flow*. Chico, CA: Paton Press.

Marsick, V. J., & Watkins, K. E. (2003). Demonstrating the value of an organization's learning culture: The dimensions of the learning organization questionnaire. *Advances in Developing Human Resources*, 5(2), 132–151. doi:10.1177/1523422303005002002

Sendjaya, S., & Sarros, J. C. (2002). Servant leadership: Its origin, development, and application in organizations. *Journal of Leadership & Organizational Studies,* 9(2), 57-64. https://doi.org/10.1177/107179190200900205

Shambrook, J. (2012). Comparison of stress-related factors in the 2007 and 2010 Research Administrator Stress Perception Surveys (RASPerS). *Journal of Research Administration*, 43(2), 107.

Shambrook, J., & Roberts, T. (2011). 2010 Profile of a research administrator. *Research Management Review*, 18(1), 19–30. Retrieved from https://files.eric.ed.gov/fulltext/EJ980454.pdf

Trindale, M., & Agostinho, M. (2014). Research management in Portugal: A quest for professional identity. *Research Management Review*, 20(1), 39–48. Retrieved from https://files.eric.ed.gov/fulltext/EJ1022036.pdf

Willenberg, K. (2014). Attributes of successful leaders in research. *Research Management Review*, 20(1), 94–99. Retrieved from https://files.eric.ed.gov/fulltext/EJ1038825.pdf

Yang, B. (2003). Identifying valid and reliable measures for dimensions of a learning culture. *Advances in Developing Human Resources*, 5(2), 152–162. https://doi.org/10.1177/1523422303005002003