Purpose: Team is a microcosm of organization. In turn, building a learning organization naturally requires how to manage team learning. In this context, the purpose of this article was to apply systems design on building a team learning process model. Method: In order to design the model, the research utilized the spiral system-design methodology, a revised version of Banathy’s systems-design process, which includes the major stages of developing a knowledge base, preparation, analysis, design, evaluation, and implementation. However, the implementation stage was not included in this study. Results: Experts’ reviews on the initial team learning process model, were arrange into ‘strengths’ and ‘improvements’. Based upon experts’ reviews, the research provided a revised team learning process model in terms of input process, transformation process, output process, guidance process. Conclusion: Through the spiral system design method, the research created an ideal process centered team learning model. Based upon the outcome of the research, the following research agenda would be develop how to effectively facilitate team learning process.

Key words: Team learning, team learning process, spiral system design methodology, discrete process, continuous process
I. Introduction

Organizations face rapid changes every day since the world is connected with each other closely and the social network and working as a team opportunities for more growth and revenue. Thus, many companies have found that organizing themselves into teams and empowering their workforce have boosted learning and performance.

Teams are considered basic and strategic units in achieving organizational excellence (Irene, Francisco, Felisa. & José, 2008; Senge, 1990; Van Offenbeek, 2001). An organization learns through actions and interactions that take place between people who are typically situated within smaller groups or teams (Edmonson, 2002). Through these teams making appropriate changes in how they do their work, an organization maintains its effectiveness in a changing world. In this sense, team learning is seen as a potential resource for the organization in maintaining high levels of competitiveness in this complex and changing environment (Edmonson, 2002; Irene, Francisco, Felisa. & José, 2008; Van Offenbeek, 2001; Yeo, 2002).

According to Senge (1990), “the fundamental learning unit” is no longer an individual, but a team, and “team learning happens when a group collectively creates the results for which its members [aim]” (p. 10). He also regards team learning as a building block for a learning organization, along with four other technologies: systems thinking, personal mastery, a mental model, and shared vision.

However, simply putting individual members together does not make a team (Senge, 1990). A business team evolves through a learning process the same way a sports team evolves from a group of people to a coherent unit. Without the team learning process, a team does not have the synergistic capacity for solving complex problems. Teams are recognized as a critical component of every enterprise. Nonetheless, most aspects of existing team environments, including measurement and compensation systems, learning and training, as well as rewards, have not yet captured the significance of teams. Many people who espouse the importance of teams still believe that “when push comes to shove, the key unit of effectiveness is the individual” (Senge et al., 1994, p. 354). In this sense, a team needs a new environment that properly manages, monitors, and facilitates team activity. If the team approach is a new solution for an organization, there should be managerial alignment between the team and its environment.

The purpose of this paper is to design a Team Learning Process Model using a systems design methodology. TL Process Model in this study is a team learning process-centered learning-by-doing environment for a real team activity, in which team members engage in a complex (heuristic) problem-solving process with the purpose of achieving the team’s desired outcome. The best way to understand that process is by looking at team learning as a model.
The reason why this research empathizes the team learning process is that process model describes in-depth dynamic activities (input process, transformation process, output process and guidance process) within the system of interest. Thus design of the model provides useful knowledge base for understanding on the team learning. This study attempt to design an ideal TL Process Model using a systems design methodology, which is a revised model of Banathy’s generic human activity based systems design methodology (Banathy, 1991).

II. Literature review

1. Theories of Team Learning

As recent research outcome on the team learning, Decuyper, Dochy, and Van Den Bossche (2010) presents integrative model of team learning based upon existing team learning theories and team dynamics researches (Dechant, Marsick, & Kasl, 1993, 1997; Senge, 1990; Tuckman, 1965). Their research conducted by way of qualitative literature review and lacks a bit of credibility in terms of methodology.

Ellis, Hollenbeck, Ilgen, Porter, West and Moon (2003) define team learning as “a relatively permanent change in the team’s collective level of knowledge and skill produced by the shared experience of the team members”. As the authors explain, this definition expands on traditional conceptualizations of the learning process at the individual level (Weiss, 1990) by that, in team contexts, people can learn not just from their own direct experience, but also from the experience of other team members. Teams are formed in a purposeful way to ensure that people learn to work with diverse people and that the teams are as even as possible (Parmelee & Michaelson, 2010; Sisk, 2011; Thomas, 2012).

Senge’s concept of team learning provides the definition and identifies concepts related to it, such as alignment of personal visions with the shared vision, systems thinking, and the selective use of dialogue and discussion in certain situations (Senge, 1990, pp. 234-269). Indeed, he considers team learning to be a microcosm of the learning organization. He also emphasizes such team dynamics issues as operational trust, defensive routines, and the synergy effect (pp. 236-237). Collective forms of learning have synergistic benefits. It is expected that team and organizational learning have greater potential to promote superior team performance, which is greater than individual learning alone (Erhardt, 2011).

Dechant, Marsick, and Kasl’s (1993, 1997) approach to team learning is compatible with Senge’s approach in that it stresses collective learning. Their research (1993) on a model of team learning was derived empirically from case studies in two companies, while Senge’s notion of TL is more conceptual and comprehensive. They provide four phases of team learning: (1) fragmented, (2) pooled, (3) synergistic, and
(4) continuous (pp. 10-12).

Team dynamics research (Bion, 1962; Comer, 1995; Harkins, 1987; Janis, 1982; Kline & Saunders, 1993; Miller & McFarland, 1987) addresses the interaction patterns that take place in a group. It also provides the means to examine positive team interactions, such as the synergy effect and trust building, while addressing such negative effects as group thinking and social loafing. Team dynamics research provides information that team learning theorists do not describe in detail. Indeed, it provides relevant information regarding how to be aware of the team as a complex dynamic system.

2. Team Learning Process

Team development research (Bales & Strodbeck, 1951; Bennis & Shepard; 1961; Fisher, 1974; Tuckman, 1965) examines the phases through which a team progresses. Without understanding this developmental phenomenon, it is difficult to facilitate team learning. Tuckman (1965) in particular used rigorous empirical studies to identify four phases of team development: forming, storming, norming, and performing. It should be noted that this dissertation emphasizes the importance of the storming stage (e.g., how to create and manage conflict) and the norming stage (e.g., how to develop group cohesion). These issues are crucial for facilitating team learning, because team learning happens when there is creation of conflict through the suspension of assumptions, awareness of team members' own fragmented perspectives, constructive deconstruction of existing mindsets, and then from that point, reconstruction of their shared vision.

The team learning process should follow a scientifically founded natural team development process as described by Tuckman’s four phases. Among sequential-stage theories, the Tuckman model is generally seen as the most established model for group development. Tuckman (1965) provided a synthetic perspective of the literature regarding the growth stages through which a group develops. The forming, storming, norming, and performing stages of growth are clarified in his research, providing a conceptual framework for understanding group development.

In the forming stage, each individual tends to retain dependency relationships with leaders, other group members, or preexisting standards. Gradually, however, through a testing process, individuals come to identify the boundaries of both interpersonal and task behavior. Orientation, testing, and dependence are the characteristics of this stage.

In the storming stage, individuals in groups experience hostility between group members and the leader and a feeling of discrepancy between one's own orientation and that required by the task. This stage is characterized by "conflict and polarization around interpersonal issues" (p. 396).

The third stage, norming, is characterized by group cohesion and acceptance of group members as they
have progressed thus far, which requires the development and adoption of group norms and high levels of commitment to the task. In this way, resistance is eliminated, “ingroup feeling and cohesiveness develop, new standards evolve and new roles are adopted” (p. 396). At this stage, for example, a group may determine that it is preferable to hear from all members and ensure the inclusion of all voices.

With the performing stage, a group arrives at the final stage in which “interpersonal structure become the tool of task activities” (Tuckman, 1965, p. 396); members have established relationships among themselves and have learned to see each other also as social entities. This stage emphasizes constructive action toward the completion of the task. It incorporates cohesion, functional role-relatedness, and emergence of a solution.

Pfeiffer (1991) regards the Tuckman model as a paragon of group development models. Pfeiffer emphasizes the following two characteristics concerning theories that identify the stages of group development (p. 177):

Movement from one stage to another is based on successfully resolving the thematic concerns of the current stage.

Both personal/interpersonal and task concerns must be addressed in each phase. These concerns are parallel and interrelated.

Research on team dynamics and team development describing factors (e.g., quality of participation, trust) affecting team dynamics and the general team evolving process (phases) provides detailed information regarding how to design an effective team learning, although there has been less investigation concerning learning issues, such as changing team members’ mindsets, changing team behavior patterns, and creating a shared vision. Indeed, many research studies have tended to avoid or neglect learning issues.

III. Research Methodology

There are two methodological phases in this paper: (1) Designing a process model, through utilization of a spiral system design process and (2) conducting a formative evaluation of the process model through utilization of experts' review.

1. Design procedures

The process of designing the TL Process Model entails using a systems design methodology and expert evaluation. The researcher interviewed the experts (participants) and redesigned the process model based on the experts' evaluation. In order to design a blueprint of the process model, the spiral system-design
methodology was used (Reigeluth & Park, 2000), a revised version of Banathy's (1991) systems-design process.

![Spiral System-Design Methodology (Reigeluth & Park, 2000)](image)

The major stages include (1) developing a knowledge base, (2) preparation, (3) analysis, (4) design, and (5) evaluation, and implementation as the table shows. However, the research did not conduct implementation because it could be carried after having further research outcome such as team learning support mechanism.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing a knowledge base</td>
<td>Developing a knowledge base for the whole TLS design process.</td>
</tr>
<tr>
<td>Preparation</td>
<td>Deciding prerequisites, e.g., defining the type of TLS—its domain and its situation—necessary before engaging in the next stage</td>
</tr>
<tr>
<td>Analysis</td>
<td>Identifying the differences between the new and old paradigms of human resource development at the organizational level (mechanical organization/learning organization), group level (non-team learning approach/team learning), and individual level (old mindset/new mindset).</td>
</tr>
<tr>
<td>Design</td>
<td>Designing the blueprint of the TLS, which includes the three kinds of models. The final stage of the design process is the expert evaluation stage, in which experts assess the model of the TLS.</td>
</tr>
<tr>
<td>Evaluation and implementation</td>
<td>Evaluating and implementing the model</td>
</tr>
</tbody>
</table>
The classification system encompassing 'strengths' and 'concerns and improvements' was designed in order to arrange the ideas that emerged from experts' feedback based upon the meaningful chunks (e.g., values and purpose; functions and components) that emerged from expert feedback.

2. Experts' review

Seven experts including theoretical researchers (Dechant, Marsick, Massey, Weigand) in team learning research area, three of them are business school professors of team learning theories builders, and practitioners (Plaskoff, Lee, Kim) in the HRD managers of global major companies participated in this study. They provided general feedback on the specific feedback for the developed model for revisions. To establish a better understanding of the experts' opinions, the researcher sought and received permission from the experts that were interviewed to use their real names in this research project.

Expert evaluation questions are below:

- What factors should be removed from this TL Process Model?
- What factors should be added to this TL Process Model?
- What and how should any factors be changed in this TL Process Model?
- What relationships among factors should be changed in this TL Process Model?

3. Data Collection and Analysis

This paper used two mechanisms for ensuring the credibility of the evaluation: member checking and triangulation. Member checking (Lincoln & Guba, 1985) allowed evaluators to provide the researcher with feedback on the researcher’s interpretations and findings so as to check the differences between the external evaluators’ opinions and researcher’s interpretations and conclusions.

The following was a member-check activity:

1. After the researcher has conducted data interpretation and determined the data's acceptability for the models' improvement, he will make a list of each evaluator's main points, interpreted by the researcher, and any decisions made in relation to the evaluators' opinions.

2. The researcher submitted the above information to the expert from whom the data came, with these instructions: "Please read my interpretations and decisions made from your evaluation results below, and then indicate your level of acceptance for each interpretation and decision."
Finally, the evaluators returned their responses to the researcher. Triangulation improves the probability that findings and interpretations (Lincoln & Guba, 1985). Denzin (1978) has suggested that four different modes of triangulation exist: the use of multiple and different sources, methods, investigators, and theories (see Denzin, 1978, pp. 471-475 for more information). This paper utilized multiple theories and cases related to team learning.

**IV. Result**

1. Finding’s based on the Experts’ Reviews

1) TL Process Model: Input, Transformation, and Output Process

Three experts made positive comments concerning the process model, with respect to a right process relationship, a clear process view, and well supported research. One pointed out that the TLS has a clear view of the team learning process based upon strong support in the literature. The other was quick to focus on the positive aspects of the way in which the team learning happens, suggesting that, "you obviously did lots and lots of research on this. You've just sourced from so many different places and people, which is great. It's good to have that depth." In sum, three experts including two practitioners felt that the process model has a clear and appropriate input, transformation, and output process. However, they also expressed some concerns and improvement and those are shown in <Table IV-1>.

<Table IV-1> Summary of Experts’ evaluation regarding Input, Transformation, and Output process

<table>
<thead>
<tr>
<th>Strength</th>
<th>Concerns and suggested improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three experts including two practitioners felt that the process model has a clear and appropriate input, transformation, and output process.</td>
<td>Top management (CEO, senior executives): Allocate tangible/intangible resources, communicate a vision for the firm, transform culture (Hitt, 1998). Human resource staff: Provide necessary learning opportunities. Internal/external experts (SME and team specialist): Provide expert advice on team tasks and process (Schein, 1988). Customers and suppliers: Provide realistic market learning opportunities (D’Andrea-O’Brien &amp; Buono, 1996; Lynn, 1999; Park, 1994).</td>
</tr>
</tbody>
</table>

2) TL Process Model: Guidance Process
For the Guidance process, one expert expressed that the compatibility between the TL guidance process and an existing human performance model could be another merit of the team learning process model. The guidance process is at the heart of the team learning process; it plays the same role that grease plays in an automobile. As a suggestion, all five experts pointed out the need for a clear explanation of the relationship between guidance process and input, transformation, and output process and incorporating the guiding principles.

### Table IV-2: Summary of Experts’ evaluation of the Guidance process

<table>
<thead>
<tr>
<th>Strength</th>
<th>Concerns and suggested improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>The compatibility between the TL guidance process and an existing human performance model could be another merit of the TLS.</td>
<td>The need for more detailed information on the guidance process (e.g., the relationship between guidance process, input, transformation, and output process)</td>
</tr>
<tr>
<td>The Need for incorporating the guiding principles for empowering, energizing, motivating, and orienting the team learning process.</td>
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</tbody>
</table>

According to the study, in addition to research support, Weigand’s, Kim’s, and Plaskoff’s positive comments add to the credibility of the process model. Also, Massey’s comment on the consistency between the guidance process and Rummler and Brache’s human performance model supports the soundness of the model. In order to improve the guidance process, the revised version needs to heed Weigand’s suggestion to add guiding principles for energizing, motivating, and orienting the team learning process. Other useful comments suggested by the experts, which need to be added in the revised version, are as follows:

- Address personality problems in the input processing.
- Articulate the rationale for the two kinds of processes: why the discrete and continuous processes are both necessary in the transformation process.
- Emphasize the dynamic and cyclical nature of the transformation process even in the discrete facilitation process.
2. Revised the TL Process Model

However the outcome of the research includes input process, output process, transformation process, and guidance process, the essential portions of research. This paper provides first, the overall big picture of team learning, second, team learning transformation process because the TL transformation process would be the central process in this research.

Two components, discrete and continuous processes, are involved in the transformation process. The transformation process in this study includes four major sub-processes: (1) initial framing of team members’ perceptions, (2) exchanging basic assumptions, (3) moving to a pooled pattern of interaction, (4) promoting collective thinking (shared vision), and (5) continuous learning with new mindsets and new behavior. The following briefly describes revised transformation processes based upon expert’s review.
### (Table IV-3) TL Transformation Process

<table>
<thead>
<tr>
<th>Initial framing of team members’ perception</th>
<th>Discrete transformation process</th>
<th>Continuous transformation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a team building process Organize the physical setting in a circle for a sense of equality (Schein, 1993). It should be noted that some corporate clients feel very uncomfortable with a circle; they may not even feel comfortable around a round table or a U-shaped set of tables. Thus the organization of the physical setting could depend on the situation. Introduce the general concept of team learning and why team learning is important (Schein, 1993).</td>
<td>Facilitate free individual expression (Dechant, Marsick, &amp; Kasl, 1993). Ensure sustained trust(Larson &amp; Lafasto, 1989). When team members fall into a vicious cycle (e.g., defensive routine), the facilitator describes unproductive dynamics with a map of their conflicts, then gives team members a chance to reflect on it and consider whether to sustain the pattern shown (Isaacs, 1993, p. 36). The conflict map can be used as a guide to correct behavior.</td>
<td>Present the whole process to the team in pictures and words before engaging in building their expectations. Combine visual, auditory, and metaphorical input to help set the stage for team learning (Simmonds, 1998). Stimulate team members to think about past team work experience in terms of best and worst cases. Ask people to share the characteristics of these experiences. Ask people for the major factors producing best and worst learning experiences. Facilitate writing down the major factors on the flipchart. Ask the team to reflect on and talk in turn about reaction to the factors (Schein, 1993).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exchanging basic assumption (world view)</th>
<th>Discrete transformation process</th>
<th>Continuous transformation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin with and stimulate conversation around the project purpose (Isaacs, 1993; Schein, 1993). Exchange ideas until enough are generated. Weigh out different views, and find some with which team members agree and others that they dislike (Isaacs, 1993, p. 35).</td>
<td>Facilitate the suspension of assumptions (Bohm, &amp; Nichol, 1996; Isaacs, 1993; Senge, 1990) in order to get to awareness of fragmentation and begin to lose their grip on certainty: Some members begin reframing (Dechant, Marsick, &amp; Kasl, 1993; Isaacs, 1993). Help members say what is really on their minds and to express their worries and beliefs about the project (Isaacs, 1993, p. 33). Help the team make observable and accessible their general patterns of thought and feeling (Isaacs, 1993). Help team members to step deliberately into their conflict, and to step back from their collective reasoning (Isaacs, 1993).</td>
<td></td>
</tr>
<tr>
<td>Discrete transformation process</td>
<td>Continuous transformation process</td>
<td></td>
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<tr>
<td>--------------------------------</td>
<td>----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Moving to pooled pattern of interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alter the pattern of interaction in the team that the group of people can directly observe (Isaacs, 1993).</td>
<td>Alter the pattern of interaction in the team that the group of people can directly observe (Isaacs, 1993).</td>
<td></td>
</tr>
<tr>
<td>Get to an awareness that they are seeking to do something different from the usual (Isaacs, 1993, p. 35).</td>
<td>Get to an awareness that they are seeking to do something different from the usual (Isaacs, 1993, p. 35).</td>
<td></td>
</tr>
<tr>
<td>Raise a question of where we are going from? (Isaacs, 1993).</td>
<td>Raise a question of where we are going from? (Isaacs, 1993).</td>
<td></td>
</tr>
<tr>
<td>Promoting collective thinking (shared vision)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create a kind of shared field in which meaning and information are exchanged (Isaacs, 1993, p. 37).</td>
<td>Create a kind of shared field in which meaning and information are exchanged (Isaacs, 1993, p. 37).</td>
<td></td>
</tr>
<tr>
<td>Synthesize team members' divergent views, such that apparent conflicts are resolved (Dechant, Marsick, &amp; Kasl, 1993).</td>
<td>Synthesize team members' divergent views, such that apparent conflicts are resolved (Dechant, Marsick, &amp; Kasl, 1993).</td>
<td></td>
</tr>
<tr>
<td>Build collective reframing (Dechant, Marsick, &amp; Kasl, 1993).</td>
<td>Build collective reframing (Dechant, Marsick, &amp; Kasl, 1993).</td>
<td></td>
</tr>
<tr>
<td>Help members make explicit the shared vision.</td>
<td>Help members make explicit the shared vision.</td>
<td></td>
</tr>
<tr>
<td>Support members to be ready for deploying shared vision into an action plan (Simmons, 1998).</td>
<td>Support members to be ready for deploying shared vision into an action plan (Simmons, 1998).</td>
<td></td>
</tr>
<tr>
<td>Continuous learning with new mindset and new behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create synergistic learning and action (Dechant, Marsick, &amp; Kasl, 1993).</td>
<td>Create synergistic learning and action (Dechant, Marsick, &amp; Kasl, 1993).</td>
<td></td>
</tr>
<tr>
<td>Develop new agreements and implementation plans. Implementation requires action (Simmons, 1998).</td>
<td>Develop new agreements and implementation plans. Implementation requires action (Simmons, 1998).</td>
<td></td>
</tr>
<tr>
<td>Translate shared vision into new behavior patterns (Cross &amp; Rieley, 1999).</td>
<td>Translate shared vision into new behavior patterns (Cross &amp; Rieley, 1999).</td>
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</tr>
<tr>
<td>Help members to deploy shared vision into a new action plan, utilizing a vision deployment matrix (Cross &amp; Rieley, 1999).</td>
<td>Help members to deploy shared vision into a new action plan, utilizing a vision deployment matrix (Cross &amp; Rieley, 1999).</td>
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</tbody>
</table>

V. Conclusion

The purpose of this study was to design a TL Process Model. In order to do so, the study (1) analyzed theories, models, cases, and empirical research relevant to the TL Process Model in order to guide its design, (2) applied a spiral systems design methodology, and (3) after developing an initial version of the ideal TL Process Model, the TL Process Model was revised based upon reviews provided by expert academicians and practitioners. A detailed description adapted from the process model based on the Banathy's systems design model. The process model indicates the necessary input, transformation, output, and guidance process.

The TL Process Model was intended to generalize to other similar environments (e.g., any kinds of problem-solving teams in physical or virtual work environments). As a rule, the more general a theory is, the more possible it is to apply it to other similar contexts. Indeed, the TL Process Model is quite general because it was designed upon the framework of a generic human activity system (HAS), rather than
Systems Design on a Team Learning Process Model

designed upon a particular case. However, the TL Process Model does not provide context-specific knowledge or detailed guidance for application to any specific environment, because the team learning system includes general guidance rather than context-specific guidance.

According to Banathy (1992), a HAS could be a family, school, organization, community, or even a virtual organization. Thus, researchers and practitioners interested in applying the framework of the TLS to other kinds of HASs need to consider the conditions of the specific HASs.

Even though the applicable scope of the TL Process Model was defined in this study within a heuristic (ill-structured) task domain in corporate settings, it is likely that differences will be found even within corporate settings. Care should be taken to apply the models with the key stakeholders’ participation or under the guidance of an experienced facilitator.

The ideal TL Process Model represents an effort to authentically understand what the team learning-by-doing environment should be. This Model will be utilized as a knowledge base necessary for identifying the essential aspects of a team learning support system, which is the next phase of the research.

Reference


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연구목적: 학습조직을 효과적으로 구성하기 위해서는 조직내의 팀학습 역량개발이 필수적이며, 또한 팀학습을 조직되기 위해서는 팀학습이 어떻게 발생하는지에 관한 통제적인 팀학습 프로세스에 관한 시스템 설계 (systems design) 필요하다. 이러한 맥락에서, 본 연구의 목적은 시스템 설계를 활용한 팀학습 프로세스 모형을 구현하는 것이다. 연구방법: 효과적으로 팀학습 프로세스 모형을 설계하기 위해서, 본 연구에서는 나선형 시스템-디자인 방법론을 활용하였다. 이 방법론에는 지식기반 구축, 시스템 디자인 준비단계, 분석단계, 설계단계, 평가단계가 포함되었다. 도출된 결과의 타당성을 확보하기 위해서 전문가 검토 및 삼각검증법 (triangulation), 구성원 검토 (member checking)가 이루어졌다. 연구결과: 나선형 시스템-디자인 방법론에 따라 설계된 초기 팀학습 프로세스 모형의 하위 요소는 input process, transformation process, output process, 그리고 guidance process를 포함하였다. 7명의 전문가 검토를 통해 나타난 결과는 본 설계안의 강점과 기대되는 수정사항으로 정리되었으며, 전반적으로 설계안의 강점을 강조하여 설계안의 타당성을 입증하였다. 또한 전문가 피드백을 근거로 최종 수정안을 제안하였다. 지역 관계로 수정된 전반적인 팀학습 프로세스 모형에 관한 큰 그림과 수정한 transformation process를 제안하였다. 논의 및 결론: 전문가 검토 결과의 균형적인 반응으로, 팀학습 시스템의 구성요소인 input process, transformation process, output process, guidance process 간의 연결성을 높일 수 있다. 즉, 팀학습에 관한 시스템적 모델은 전반적인 팀학습이 어떻게 일어날 수 있는지에 관한 체계적 이미지를 부여한다. 따라서, 이러한 결과를 바탕으로, 추후 연구로서 어떻게 팀학습을 효과적으로 촉진할 수 있는 팀학습 지원체제를 제안해 볼 수 있었다.

주요어 : 팀워크, 팀학습 프로세스, 나선형식 시스템 디자인 방법론, 독립적 프로세스, 지속적 프로세스