

Serious play approaches in participative ergonomics

Martina KELLY¹ and Ralph RIEDEL²

¹*Mechanical Engineering, College of Engineering & Informatics, NUI Galway, Ireland*

²*Department of Factory Planning and Factory Management, TU Chemnitz, Germany*

Abstract. Recent years have seen the focus of research in Participatory Ergonomics (PE) shift to the development of tools to support the PE process. The mechanisms and key theories underlying LEGO® SERIOUS PLAY® (LSP) suggest that it is a suitable tool to support this process. The core of LSP is a facilitated workshop where participants respond to tasks by building symbolic and metaphorical models using LEGO bricks. LSP is an innovative, experiential process which has been shown to extend players' awareness of problems and ideas, enhance creativity and enable teamwork. As such, LSP should be able to fulfill the requirements of PE in generating acceptable ergonomics solutions.

Keywords. serious play, participative ergonomics, learning, group decision making.
Introduction

For many years Participatory Ergonomics (PE) has been used successfully as a means of involving people in decision-making and problem-solving regarding their own work activities. With worker involvement, decisions and solutions tend to have greater acceptance and hence greater sustainability. Although the literature provides much guidance around the planning aspects of a PE intervention, identifying and developing tools to support the PE process has been more problematic. This paper suggests that LEGO SERIOUS PLAY may bridge this gap. Outlining the serious play approach in general and the Lego Serious Play approach in particular, it is suggested that the mechanisms and key theories underlying the 'play' approach can support the PE process.

1. Participative Ergonomics

According to Wilson (1991) "Participation as "a philosophy and as an underlying mechanism is important to many work redesign approaches and initiatives. Within ergonomics it is especially relevant". For many years PE has been used successfully as an ergonomic intervention with the aim of involving people in decision-making and problem-solving regarding their own work activities. The success of this approach has been largely due to the understanding that those who use the system/product etc. have an in-depth and useful knowledge of that system/product. If users are included in decision-making and problem-solving then these decisions and solutions will have greater acceptance and hence greater sustainability.

A systematic review of the literature on the process and implementation of participatory ergonomic interventions by van Erd et al. (2010) concluded that while there is no 'one best way' to implement a PE program, some common elements can be identified. These include:

- Creating teams with appropriate members
- Involving the right people in the participatory ergonomics process
- Defining participants' responsibilities
- Making decisions using group consultation
- Providing ergonomic training
- Addressing key facilitators/barriers to the PE process.

One of the strengths of participatory ergonomic approaches is their adaptability to the context and needs of the workplace, job tasks and workers. Recent years have seen the focus of research in PE shift to the development of tools to support the PE process. This paper proposes that a Serious Play approach can provide such a support tool while maintaining the required adaptability to the workplace, task and worker.

2. Serious Play

2.1 *The serious play approach in general*

Play can be defined as tossing aside the rules of “regular life” for a period of time in order to follow new rules or try new possibilities (Rieber et al., 1998). With play, a space is built away from normal activity fostering improvisation, taking on new roles, imagining, and hence developing creative intelligence. Play is understood as a voluntary activity involving active (often physical) engagement. The term “serious” tries to distinguish playful or playing activities in a work situation or adult’s life context from those activities performed by children where play is used for its own sake. Serious play is meant to be especially suitable for situations demanding creative, out-of-the-box or holistic thinking and incorporates a high degree of personal commitment and engagement. Playing games is also seen as a way of telling stories, which in turn is fundamental for creating understanding and enabling learning (Rieber et al., 1998).

Previous research on play has led to at least three “levels” of play: 1) participation (fun and games); 2) problem solving (development of physical and mental perceiving tools); 3) catalytic action (that allow an individual to intuitively tap into opportunities, to become spontaneous). The research on play is strongly rooted in anthropology and is generally organized around the following four themes: play as progress, play as fantasy, play as self, and play as power (Rieber et al., 1998).

The approach of Serious Play makes use of the aforementioned mechanisms by extending players’ awareness of problems and ideas, enhancing their creativity, enabling teamwork etc. The content or context of the play is “serious” by addressing some real life or working life issues. In practice there are different approaches for Serious Play, for instance theatre games, physical modeling, and also using Lego® bricks for building metaphors and stories, the so called Lego® Serious Play® approach.

2.2 *Lego Serious Play*

The development of Lego® Serious Play® (LSP) was initiated by the president and owner of the LEGO Company, Kjeld Kirk Kristiansen, to facilitate the strategy building process of the company using its own products. LSP is a facilitated workshop where participants respond to tasks by building symbolic and metaphorical models using LEGO bricks and subsequently presenting them to the other participants. The LSP method builds on a set of basic values, which are ‘The answer is in the system’, ‘Everyone has to express his/her reflection’ and ‘There is no ONE right answer’. In this way the method enables the non-judgmental, free-thinking and somehow playful interaction between the participants leading to a common understanding, and to creative ideas etc. (Kristiansen et al., 2009;

Hansen et al., 2009).

The LSP concept is founded on some key theories: (1) the importance of play as a way to learn through exploration and storytelling; (2) constructionism; (3) the hand-mind connection as a new path for creative and expressive thinking; and (4) the role of the different kinds of imagination. The process in a LSP workshop is built on four structural principles:

- Construct
- Give meaning
- Make the story
- Reflection

In an LSP workshop the participants are asked to build or construct their perception of a particular problem. In the following spontaneous building process the participants give meaning to the models by “tapping into their brains”. When the building phase is finished each person explains his or her perception (or story) to the other participants. The other participants can ask for clarification on details but they have to respect the model and also the meaning that is attached to it. During the reflection part of the workshop, insight is created for both the individual and the team as a whole (Frick et al., 2013; Kristiansen et al., 2009; Hansen et al., 2009). An example of such a model can be seen in Figure 1 below.



Figure 1: *LSP Model Representing the Vision for a Design Department*

Based on individual models the participants can then be challenged to build a shared model, to draw connections and to create a landscape also modelling external “agents”, to play with the model, reflecting different scenarios and possible reactions and in the end to extract simple guiding principles for instance for the organization, for a team etc. (Kristiansen et al., 2009).

As LSP is a rather generic principle it can be applied to a multitude of problems, e.g. strategy development, organizational development, product development, change management processes, mergers and acquisitions, team development, etc. (Hadida, 2013; Jentsch et al., 2011 and 2013; Frick et al., 2013; Hansen et al., 2009;)

The mechanisms and key theories of LSP lead to the conclusion that the method might also be a suitable approach to support participative ergonomics. An indication of its suitability is given by Cantoni et al. (2011) who used the LSP method to specify user requirements for online communication applications.

3. Synthesis: Serious play approaches in participative ergonomics

In discussing the suitability of using the LSP method as a suitable tool in PE, a perspective on different aspects of PE – organizational, decision making/problem solving

process, implementation – might be helpful:

Firstly, PE is based on work in teams. As research in team work has shown (Fisher, 1974) there are many obstacles for group decision making; for instance group think, higher risk taking, micro-politics, etc. One of the basic challenges in group decision making is to create a shared mental model of the problem that is addressed in the decision making process. Here LSP obviously offers potential. When bringing a team together the team development (creating identity, clarification of objectives and roles) etc. (Tuckman & Jensen, 1977) can be greatly accelerated by working on a shared model of the team or of the organization. Furthermore, when getting the team to work on a shared model of the process, accompanied by a discourse on its particular aspects, a joint mental model of the design object can be created.

Secondly, PE is meant to create design solutions which are of good quality and which are widely accepted. During the LSP process a multitude of alternative solutions can be created and since the methodology heavily supports the discussion on those, it can be expected that the quality of the final outcome will be rather high. Moreover, based on the hand-mind-connection and the flow-principle, LSP is simultaneously creative and out-of-the-box thinking. The communication process inherent in the LSP method facilitates the involvement of the relevant stakeholders and their requirements. This communication process and the work on a shared model foster the identity of the participants with the solution. Both stakeholder involvement and identity lead to a high level of acceptance.

Thirdly, the implementation of the developed solution and the respective change process are supported by a shared model as well as a high level of identity and acceptance. Furthermore, the change management process itself can be addressed by LSP. The method offers the potential to play with ‘what-if’ scenarios and so success factors, possible obstacles etc. can be addressed, and strategies and guidelines for ensuring a successful implementation can be derived. Roles and responsibilities related to the change process can be defined.

While the advantages of using LSP as a tool for Participatory Ergonomics appear evident, it is prudent to identify a number of caveats. The facilitator of the workshop must be trained in LSP facilitation as well as PE facilitation. A large part of this facilitation is clearly and accurately stating the ergonomics/human factor problem to be solved at the outset. This is critical in focusing the group’s attention on the specific problem to be addressed to ensure a successful outcome to the LSP/PE process. Managing the process is essential: this includes strict timekeeping to ensure all stages of the process are completed within the timeframe allotted, i.e. introductory phase, individual model building, and shared model building. One of the advantages of LSP is that all participants get an opportunity to contribute to the group without interruption as they describe their model. However, there may be reluctant participants and/or unusual group dynamics and these issues, if they arise, will need to be managed in order to achieve the shared mental model described in the previous paragraph. Finally, ergonomics/human factors problems can be very complex and usually have to be addressed within a broader systems perspective. It may be difficult to capture this complexity within a single LSP workshop.

4. Conclusion and Outlook

There are many potential advantages to using LSP as a support tool for a PE programme or process. For instance, LSP can help in facilitating a common understanding of the work process, work environment and user and task requirements within an organizational setting. In addition, depending on where the organisation sits in its strategic thinking, LSP can help in creating a shared ‘meta-level’ understanding of

ergonomics on the one hand, as well as facilitating a more concrete ‘bottom-up’ approach if this is more appropriate. Heterogeneous groups or teams can become sensitised to the concept of ergonomics/human factors and this can aid in the development of a common identity around ergonomics and a culture of placing the human at the centre of the process. LSP can help in the derivation of guidelines for ergonomic design, its implementation, and can aid in the clarification of roles and responsibilities, as well as identifying success factors and stumbling blocks. Particularly, as LSP uses a physical 3D model, it encourages and supports participants in identifying and explicitly addressing issues (both positive and negative) as they arise.

Hignett et al. (2005) provided an overview of PE interventions using examples from a range of industries. Haines and Wilson (2003) provided a synopsis of methods and techniques which might be used during the PE process e.g. pareto analysis, round robin questionnaires, layout modeling, mock-ups etc. More recently Robertson et al. (2013) developed the Intervention Design and Analysis Scorecard (IDEAS) as a planning tool to assist the PE process. We see Lego Serious Play as providing another tool in the PE toolkit. Addressing the need for worker involvement, teamwork and group consultation as requirements for a successful PE programme, LSP can provide the methodological support necessary for generating high quality and sustainable solutions to ergonomic problems.

References

- Cantoni, L.; Faré, M., and Frick, E. (2011). User Requirements with Lego. Università della Svizzera italiana, Lugano.
- Fisher, B.A. (1974). Small Group Decision Making: Communication and the Group Process. NY: McGraw-Hill.
- Frick, E.; Tardini, S.; Cantoni, L. (2013). LEGO®SERIOUS PLAY® - A state of the art of its applications in Europe. White Paper, Università della Svizzera italiana, Lugano, Switzerland.
- Hadida, A. (2013). Let your hand do the thinking! Lego bricks, strategic thinking and ideas generation within organizations. *Strategic direction*, 29(2), 3-5
- Haines, H.M. and Wilson, J. R. (2003). Participatory Ergonomics. *Proceedings of the XVth Triennial Congress of the International Ergonomics Association and the 7th Joint conference of the Ergonomics Society of Korea/Japan Ergonomics Society, ‘Ergonomics in the Digital Age’*, Seoul, Korea.
- Hansen, P. K., Mabogunje, A., & Haase, L. M. (2009). Get a Grip on Sense - Making and Exploration Dealing with Complexity through Serious Play. IEEE International Conference on Industrial Engineering and Engineering Management. ed. Hongyi Sun; Roger Jiao; Min Xie. IEEE Press, pp. 1593-1597.
- Hignett, S. Wilson, J.R., and Morris, W. (2005). Finding ergonomic solutions—participatory approaches. *Occupational Medicine* 55(3)200–207
- Jentsch, D.; Riedel, R.; Müller, E. (2011): Strategy and Innovation for the Production Systems of SME. In: Doolen, T.; Van Aken, E. (Hrsg.) *Proceedings of the 2011 Industrial Engineering Research Conference (IERC)*, Reno, 201
- Jentsch, D.; Riedel, R.; Müller E. (2013): Flow and Physical Objects in Experiential Learning for Industrial Engineering Education. In: Emmanouilidis, C., Taisch, M., Kiritsis, D. (eds.): *Competitive Manufacturing for Innovative Products and Services: Proceedings of the APMS 2012 Conference, Advances in Production Management Systems. IFIP Advances in Information and Communication Technology (IFIP AICT, Series ISSN: 1868-4238)*.
- Kristiansen, P.; Hansen, P. K.; Møller Nielsen, L. (2009). Articulation of tacit and complex knowledge. 13th International Workshop of the IFIP WG 5.7 SIG. ed. / Paul Schönsleben; Matthias Vodicka; Riitta Smeds; Jens Ove Riis. Eidgenössische Technische Hochschule Zürich, Laboratorium für Lebensmittel-Verfahrenstechnik, 2009. p. 77-86
- Rieber, L. P., Smith, L., & Noah, D. (1998). The value of serious play. *Educational Technology*, 38(6), 29-37.
- Robertson, M., Henning R., Warren, N., Nobrega, S., Dove-Steinkamp, M., Tibirica, L. and Bizarro, A., CPH-NEW Research Team. (2013). The Intervention Design and Analysis Scorecard: a planning tool for participatory design of integrated health and safety interventions in the workplace. *Journal of Occupational Environmental Medicine*. 55 (12) 86-88

- Tuckman, B.W. & Jensen M.A.C. (1977). Stages of Small-Group Development Revisited. *Group & Organization Management*, 2 (4), pp. 419-427.
- Van Erd, D., Cole, D., Irvin, E., Keown, K., Theberge, N., Village, J., St. Vincent, M. and Cullen, K. (2010). Process and implementation of participatory ergonomic interventions. *Ergonomics* 53(10) 1153-1166
- Wilson, J. R. (1991). Participation - A Framework and a Foundation for Ergonomics? *Journal of Occupational Psychology*. 64. 67-80
-