E-Learning at Work and the Workplace
From Education to Employment and Meaningful Work with ICTs
Proceedings of the European Distance and E-Learning Network 2014 Annual Conference
Zagreb, 10-13 June, 2014
ISBN 978-963-89559-7-5
ISSN: 2707-2819
doi: https://doi.org/10.38069/edenconf-2014-ac-0007

INVESTIGATING RELATIONSHIP BETWEEN SELF- AND CO-REGULATORY LEARNING PROCESSES IN A WORKPLACE E-LEARNING SYSTEM

Ebrahim Rahimi, Delft University of Technology, Sebastiaan Tampinongkol, Achmea Company, Mohammad Sedighi, Jan van den Berg, Wim Veen, Delft University of Technology, The Netherlands

Abstract

While supporting regulatory learning processes in work environments is increasingly becoming important, there is not a clear picture of the interaction between self- and co-regulatory processes performed by learners in workplace e-learning systems. In this paper, by following a design-based research methodology, we develop a theory-based framework to support the design of an e-learning system aiming at supporting learning regulatory processes in work environments. Then we evaluat the relationship between self- and co-regulatory processes conducted by 177 users in a prototype built upon this framework. The results suggest that there is a significant relationship between self- and co-regulatory learning processes.

Introduction

While learner-centric theories such as self-regulated learning (SRL) seem appropriate to inform the design of e-learning systems aiming at enhancing learner's control, there are deficiencies within SRL research when applied within workplace settings. Historically, SRL has been conceptualised and researched from an individual perspective within formal settings with disconnected individuals, emphasising cognitive and meta-cognitive aspects of learning processes. As asserted by Voelt, Vauras, and Salonen (2009), one deficiency of most SRL models is the reduction of the regulating process to the individuals "with little consideration of the vertical infiltrations from higher systemic levels (i.e., interpersonal interactions, relationships, social structures, socio-cultural structure" (p.6). According to Voelt, Vauras, and Salonen (2009), any reductionism to either the individual or the social levels can neglect important aspects of actual learning settings, including:

- the real time multimodal and multilevel learning processes,
- the context and its situational cues which trigger differential appraisals and regulatory patterns in persons with different response tendencies,

- the developmental history and individual psychological organization, and
- the development history of interpersonal organization.

Recently, there has been increasing attention given to the context in which the regulatory process takes place and the social and emotional processes which are components of it (Boekaerts, 1999). However, it is still unclear how the individual and social aspects of regulation processes interact and contribute to explain individual and group engagement in real-life learning situations (Grau & Whitebread, 2012; Voelt, Vauras, & Salonen, 2009).

The purpose of this paper is to propose a theory-based framework to design e-learning systems aiming at supporting learning regulatory processes in work environments and then to analyze the relationship between self- and co-regulatory processes performed by learners in a prototype built upon this framework. In the remaining sections of this paper by following a design-based research approach, first we identify a practical learning problem in a work environment and then develop a theory-based framework and solution to address the identified problem. Then, we describe the implementation of a prototype built upon this framework. Finally, we scrutinize the possible relationship between self- and co-regulatory processes accomplished by learners in this prototype.

Design-based research methodology

To design a technology-based aiming at supporting regulated learning processes and get insight into the interplay between these processes, we adopted a design-based research (DBR-) approach. Design-based research is a research methodology that focuses, simultaneously, on practice and theory through finding and solving practical problems and providing design principles. Design-based research is an iterative process comprised of four phases (Reeves et al., 2005):

1. identifying and analyzing a complex real world educational problem in the research context by researchers and practitioners in collaboration,
2. generating a solution based on reviewing existing theories and consulting with practitioners,
3. evaluating the solution by gathering empirical data, and
4. reflecting on the design experience to refine the solution and construct theoretical knowledge.

Analysis of a practical problem

The context of this research is the *customer contact center (CCC)* of Achmea insurance company in Netherlands. Communicating with customers to sell insurance products and providing accurate and quick answers to their requests and questions are the main activities of the CCC salespersons. The performance of salespersons in these activities has direct effects on selling products, satisfying customers' needs, and the company reputation and, therefore, can

ISBN 978-963-89559-7-5

largely influence the organization's objectives and benefits. During the interviews with sales managers and salespersons it was realized that the salespersons' organizational awareness, or their update knowledge about occurred changes in relevant insurance information, can largely influence their performance. During the requirements' analysis phase several reasons have been revealed which could undermine these salespersons' awareness, including:

- rapid and frequent changes in the required information sources such as the national and international policies, rules, and legislations with direct impact on customers; new products, procedures and services within the organization; information about other competitors companies and their taken approaches,
- high working pressure and tight working structure resulted in the lack of adequate time for updating their knowledge, and
- lack of appropriate technology-based learning environment to support and facilitate self- and co-regulatory learning processes.

Development of a theory-informed solution

Any e-learning system aims to support and enhance the regulatory learning processes in workplace settings should address several requirements. First, it should conform to the principles of adult learning. Tynjälä and Häkkinen (2005) described the main elements of adult learning theories useful to inform the design of e-learning systems for work environments. According to them, learning in work environments should

- recognise the learner's experience,
- involve the learner in reflective process and social processes,
- follow a context-based and problem-oriented approach, and
- benefit both personal development and organizational learning processes.

Second, supportive social and emotional learning environment and interpersonal relationships are important elements to support and sustain self-regulated learning processes in work environments. Accordingly, one function of an e-learning system in work environments should be the development of a good emotional and motivational atmosphere in a working group through playful activities (Tynjälä & Häkkinen, 2005). One possible way to fulfil this functionality is to combine educational games with collaborative-based learning scenarios. This combination introduces a fun element to the learning environment and can stimulate competition-based learning and motivate learners to actively participate in the learning activities by promoting their desire to improve, interacting with information and tools as well as by collaborating with other learners within the game, and exciting awe and pleasure (Kim et al., 2009).

Third, during the past decade, interest in the flexible delivery and learning as a preferred training and learning method in workplace settings has increased (Smith, 2003). Flexible delivery is built upon a perception that training and learning methods need to be more responsive to changing requirements of the organizations and increase enterprise

ISBN 978-963-89559-7-5

competitiveness (Stewart & Winter, 1995) through fulfilling diverse learning needs of employees and preparing them to be self-directed and autonomous learners. Accordingly, central feature of a learning environment built upon the flexible delivery approaches is to support learners control over what, where, when and how to learn (Smith, 2003).

Fourth, as explained by Zimmerman, Bonner and Kovach (1996), four factors are essential in carrying out individual regulatory learning processes being *learning schedules*, *materials*, *scenarios*, and *quality*. Learning schedules are required to help the learners make their own learning methodical. Also, the learners need qualitative learning materials as well as appropriate learning scenarios to assist them to get rid of challenging with the difficulties and complexities of accessing the learning materials or other sorts of distractions (Shih et al., 2010).

Equipped with these principles, a conceptual framework as shown in Figure 1, was developed to be used to support the design of an e-learning system to address the identified problem in this context. The rationale behind this framework states that organizing learning in flexible ways can support learners' autonomy and assist them to tailor the e-learning system to their learning requirements. Further, providing the learners with appropriate structure in terms of learning schedules, scenarios, and content can accelerate their knowledge updating process and support them to keep control over their learning process. Moreover, the principles of adult learning provide guidelines to design and implement context-based and authentic learning situations and meaningful content. Finally, employing social game-based learning strategies has the potential to trigger and sustain a shared regulation process through building and fostering learners' motivation.

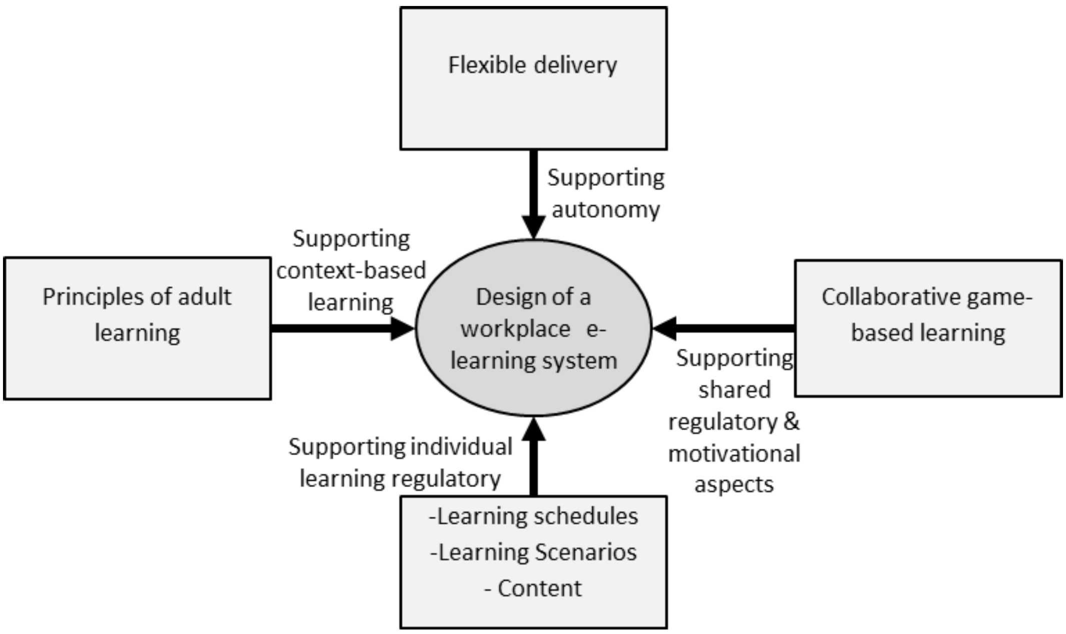

Figure 1. A framework to support the design of an e-learning system for work environments

ISBN 978-963-89559-7-5

Implementation of a prototype

Figure 2 illustrates the architecture of a prototype, called as 'PowerApp', built upon the proposed framework. According to this architecture, each learner is provided with personalized learning content based on criteria such as the learner's previous activities in PowerApp and organizational parameters. The content-base provides the learners with a wealth of various learning content in terms of brain snack, brain breaker, and poll questions, where they can choose and learn according to their needs and preferences. To make learning meaningful and context-based, the content items are developed by an expert team according to the real situations, problems and practices of work environments. To support fast learning and comply with the limited learning time of employees, each content combines small amount of information in text or graphic formats to be read or answered in short time periods.

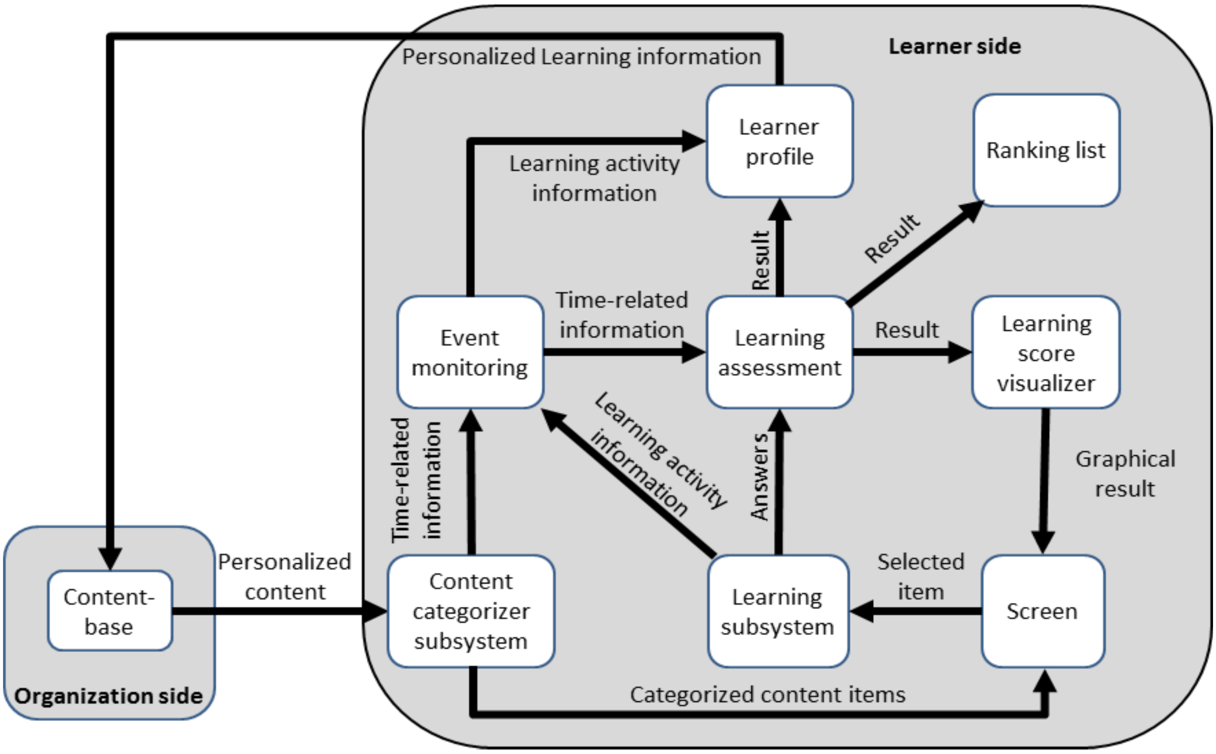

Figure 2. Architecture of the PowerApp prototype

The content categorizer subsystem categorizes content items and sends them to PowerApp's screen. To support this categorizing process, each content item has three features namely

- the type of the learning function,
- the type of the knowledge category and
- the time indicator.

ISBN 978-963-89559-7-5

Type of learning function

The type of learning function determines the way that the content item can be practiced and learned by the learner. There are four types of learning function supported by PowerApp: brain snack, brain breaker, poll question, and duel-learning game. Brain snacks (BS) are content items that provide kind of did-you-know information on a particular topic. Brain breakers (BB) are content items that go more in depth than BSs by providing some information in a particular topic to be read by learners, and then assessing and evaluating their understanding about the content through asking some questions. Poll questions are multiple-choice questions aiming at knowing the employees' opinions about a specific topic. With the Duel-learning game items the learner can select a peer to challenge each other knowledge in a specific topic by asking a series of multiple-choice questions that come from the content-base. To play a duel-learn game, first the challenger should invite an opponent peer to the duel-learning game and then to choose a knowledge category in which the questions would go. After accepting the invitation request by the opponent, the duel-game starts and the challenger and opponent both answer the same questions in a specific time sequence and get a score based on the number of right answers and the speed of their answering. After answering all questions the peers immediately will be informed about the result of the game. The final scores are shown in a public ranking list to be seen by other users. If one of peers does not answer her question within specified time duration the duel-learning game will be cancelled.

Type of knowledge category

To increase their awareness and support organizational objectives and requirements, the employees need to learn four types of information and knowledge: knowledge about insurance industry, financial and procedural knowledge, skills, and organizational culture. Each content item contains information pertain to one of these four categories.

Time indicator

Time management is a key element of self-regulated learning process. Due to the employees' high working pressure and limited learning time, developing effective time management skills and facilitating the use of short time periods between consecutive calls for learning purposes was one of the main functional requirements of PowerApp. Therefore, to develop the time management skills and encourage learners to access content items rapidly, as a part of learning schedule, a time-based scoring mechanism was implemented in PowerApp. Based on this mechanism, the event monitoring subsystem receives the time-related information about the learner's learning activities and sends them for the learning assessment subsystem. The learning assessment subsystem then calculates the learning scores of the learner based on her performance in learning subsystem and time variable. In other words, if an employee answers a content item correctly in the first week of releasing the content, she will receive more score

ISBN 978-963-89559-7-5

than an employee who answers the same question correctly in the second week after releasing the content.

PowerApp provides each learner a personalized screen where the learner can manage and direct her learning activities. Figure 3 illustrates different parts of this screen. As shown in this figure, the screen consists of two main parts, including learning score visualizer (the top part) and a scrollable part to be used as an activity space to select, manage, and learn content items (the down part). Each puppet in the learning score visualizer part is assigned to a knowledge category and presents the learning score of that knowledge category earned by the learner through reading or answering related content items. By passing time, the filled level of each puppet diminishes slowly. By reading and answering content items or doing duel-learning games the puppets will be filled up based on the level earned learning score. This visualizing mechanism follows two purposes:

1. to encourage the learner to update her knowledge continuously, and
2. to build learner's internal motivation by satisfying her feeling of accomplishment and reputation.

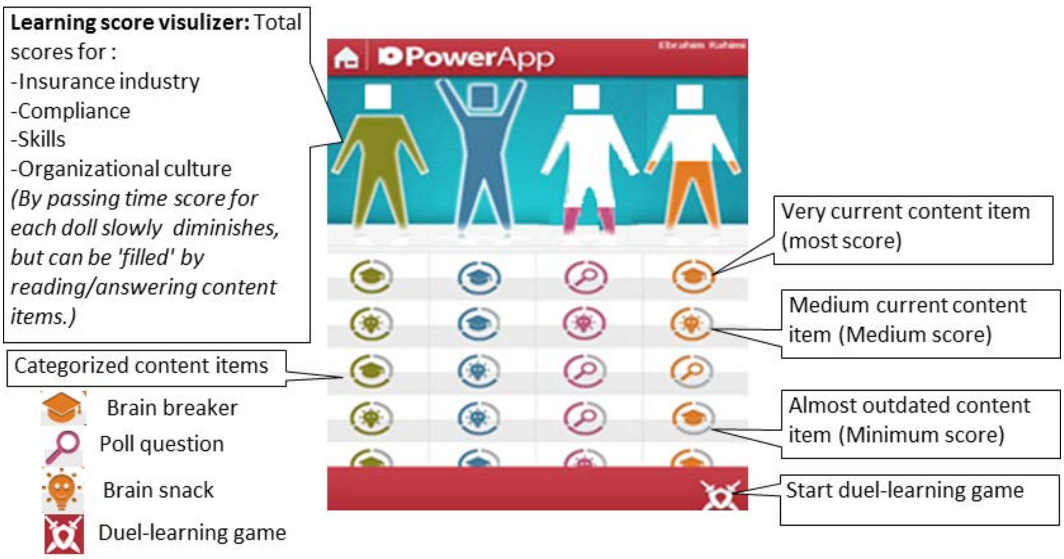

Figure 3. The personalized screen of the PowerApp prototype

Evaluation and testing of PowerApp

The objective of this research is to investigate the relationship between the self- and co-regulatory learning processes performed by learners using PowerApp. The following research question directed the data collection and analysis processes: Is there a relationship between individual-basis and social-basis regulatory behaviours of employees in PowerApp?

ISBN 978-963-89559-7-5

Research setup and participants

To answer the posed question, an experiment was conducted with a pilot group consisting of 177 managers and employees from 21 teams belonging to 5 different subdivisions of the organization. The participating users consisted 59.32% of female (n=105) and 40.68% of male (n=72) participants. The users aged from 18 to 61, with a mean age of 36.98 years (S.D.=10.83). Before starting the evaluation process, the participating users were informed about the functionalities and objectives of PowerApp by their managers and through workshops. For users different accounts were created by which they could access PowerApp inside and outside of the company via Internet. The users were encouraged to access and use PowerApp at their free times especially between consecutive calls in order to reduce its influence on their job's productivity. There was a team of technical and content experts available to solve technical or content-related problems. At beginning, a limited number of content items were uploaded in PowerApp and every Monday a new batch of content items was uploaded to the system. The evaluation phase lasted 45 days.

Data collection and analysis process

To answer the posed research question, the actual data about all activities performed by the users stored in PowerApp data logs were retrieved and analyzed. To define metrics to measure self-regulated learning process, we used the constructed defined by the Online Self-Regulated Learning Questionnaire (OSLQ) (Barnard, Paton & Lan, 2008). The OSLQ defines six constructs to measure the individual-based regulatory process, including: goal setting, time management, task strategies, and self-evaluation. As self-regulated learning skills and strategies are "highly context dependent" (Schunk, 1989), we appropriated these constructs according to the architecture and functionalities of PowerApp by defining three metrics: Time index (time management), diversity of content (goal setting), and individual activeness (task strategies and self-evaluation):

- **Time index** – Refers to the number of days a user accessed the system to do individual-based learning activities. This metric was used to measure the time management aspect of the self-regulatory process followed by the user in using PowerApp.
- **Diversity of chosen content categories** – Refers to the number of different content categories a user read or answered during performing individual-based learning activities. This metric was used to measure the goal setting aspect of the self-regulatory process followed by the user in using PowerApp.
- **Individual activeness** – Refers to the number of individual learning activities accomplished by a user in PowerApp. The individual-based learning activities that the user performs consist of different learning functions (i.e. brain breaker, poll question, and brain snack) and assessing her knowledge by answering brain choices and brain selects. The former corresponds to the task strategies construct of OSLQ and the latter corresponds to the self-evaluation construct. Accordingly, the individual activeness

ISBN 978-963-89559-7-5

metric was used to measure both the task strategy and self-evaluation aspects of the self-regulatory process followed by the user in using PowerApp.

- **Co-regulation metric** – PowerApp mainly has capitalized on duel-learning games to support and foster co-regulatory learning process among the users. In order to measure the level of co-regulation performed by a user in PowerApp, we first identified the number of duel-learning games initiated, accepted and continued by a user as an initial index. Then, as during each duel-learning game the user answers to five questions, we multiplied this index by five to calculate the co-regulation metric for the user.

We used several tools including Microsoft Access, Excel, and SPSS for facilitating the processes of retrieving, collecting, and analysing data and measuring these constructs for all the users participating in this pilot study. After measuring these constructs for each user, the Pearson's correlation analysis was used to determine the correlation between self- and co-regulatory learning processes.

Results

This section describes the statistical relationship between the defined constructs. Table 1 provides summary statistics for these constructs for the entire sample in the analysis. According to this table, the individual activeness ranges from 0 to 160 with a mean of 26.13 which shows a broad variety in the number of individual-based learning activities accomplished by the users in PowerApp. On average each user conducted 26.13 individual-based learning activities in PowerApp. The time management index varies from 1 day to 18 days with a mean of 4.7 access frequency to PowerApp. Diversity of chosen content ranges from 1 to 4 with a mean of 2.6, which indicates that the users, on average, have read or answered content items relating to more than 2 types of content categories. The co-regulation index ranges from 0 to 145 with a mean of 11.44 which indicates that while there are very active users in social learning (i.e. n=145 answered questions through duel-learning games), the majority part of the users only answered, on average, 11.44 questions through duel-learning games.

Table 1: Descriptive statistics (N=177)

Variables	Minimum	Maximum	Mean	Standard deviation
Time management index	1	18	4.70	1.68
Individual Activeness	0	160	26.13	35.32
Diversity of chosen content	1	4	2.63	1.19
Co-regulation index	0	145	11.44	22.45

Table 2 represents the results of Pearson's correlation analysis between the self-regulatory learning process factors. As illustrated in this table, there are significant relationships at 0.05 level between the time management index and individual activeness (correlation =0.503), the time management index and diversity of chosen content (correlation =0.341), and the individual activeness and diversity of chosen content (correlation =0.625).

ISBN 978-963-89559-7-5

Table 2: Pearson's correlation table (N= 177)

Variables	**Time management**	**Individual Activeness**	**Diversity of chosen content**
Time management index	1.000		
Individual Activeness	0.503**	1.000	
Diversity of chosen content	0.341**	.625**	1.000

*. Pearson's correlation is significant at 0.1 level (2-tailed)
**. Pearson's correlation is significant at 0.05 level (2-tailed)

Next, we used regression analysis to investigate the impact of self-regulatory factors on the co-regulatory factor as the dependent variable. Linear regression estimates the coefficients of the linear equation by involving one or more independent variables that best predict the value of the dependent variable. We used a stepwise regression model to determine a significant model. Table 3 shows the results of ordinary least square regression provided by a stepwise regression model with the co-regulation index as the dependent variable and time management index, individual activeness, diversity of chosen content and working experience as the independent variables.

Table 3: Regression results

Variables	**Statistics**		
Time management index	10.542 (1.245)***	7.226 (1.517)***	6.857 (1.515)***
Individual Activeness		0.176 (0.049)***	0.129 (0.054)**
Diversity of chosen content			2.856 (1.413)**
Adjusted R^2	0.285	0.331	0.343
Constant	-4.575*	-4.330*	-9.467**
F	36.067***	29.996***	22.920***
No of observations	177		

The dependent variable is Co-regulatory factor.
Standard errors are reported in parentheses.
*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

As represented in this table, the time management index, individual activeness, and diversity of chosen content can together interpret 34% of data which influence the co-regulatory factor. However these factors impose different influence on the co-regulatory so that the time management index has the largest share while the diversity of chosen content has the lowest share in the final model.

ISBN 978-963-89559-7-5

Discussion and conclusions

The results shown above suggest that there is a significant relationship between self- and co-regulatory learning processes conducted by users of PowerApp. The nature of this relationship can be scrutinized from several perspectives. First, the correlation between the time index and co-regulation constructs suggests, that the more access to PowerApp for conducting individual learning activities, the more participation in co-regulating process, vice versa. To explain this relationship, one can argue that taking part in shared learning activities such as performing duel-learning games are time-consuming learning activities, which require time and effort by peers to proceed. Considering the time index as an indicator of the time management skill of the users, this relationship suggests that users with better time management skills participate more actively in shared learning processes. As remarked by Grau and Whitebread (2012) and Rahimi et al. (2013), in the context of collaborative learning, learners bring their own ideas, conceptions and self-regulatory abilities to the group work and all these personal characteristics will play a role in their engagement in the group activity. On the other hand, it can be argued that by active participation of users in co-regulatory process it is likely that they would increase their access frequency to PowerApp for performing individual learning activities. To explain this argument, we need to consider two mechanisms implemented in duel-learning games namely (i) answering, changing turn, and waiting for the peer's response, and (ii) time-based scoring. It can be argued that these mechanisms can cause frequent access of the peers to PowerApp for knowing their opponent reactions on the game. As a possible scenario, one can imagine a situation that a peer accesses PowerApp to know the state of the game and when she sees no change in the game's status she may perform some individual learning activities.

Second, the correlation between individual activeness and co-regulation suggests that the more activeness in performing and regulating individual-based learning activities, the more activeness in conducting co-regulatory learning processes. To scrutinize this relationship, we need to consider the elements of PowerApp that might create a learning space promoting users to perform individual-based learning activities and self-regulate their learning. These elements are: visualized scoring mechanism, motivational factors (i.e. sense of accomplishment, filled puppets), supporting users' personal choice in terms of content and learning function, facilitating self-evaluation of learning and providing immediate feedback. The combination of these elements plays a significant role to assist users in self-regulating their learning and taking control over their learning process. From this perspective, duel-learning games can be seen as a continuation of this learning space with similar elements including motivational aspects (i.e. winning a duel game, fun elements and competition-based learning), personal choice (i.e. freedom in choosing peers and content), self-evaluation of learning, and providing immediate feedback. Accordingly, one can argue that this similarity might encourage the active users in individual activities to take part in social activities as a means to support their personal development. In this regard, as asserted by Voelt, Vauras, and Salonen (2009), co-regulation is not directed at the achievement of explicit individual or collective goals but aimed at productive co-participation in a social activity, with impact on individual development in the broad sense such as identity development. Also, as asserted by Huang (2002), interactivity can be envisioned as an effective way to motivate and stimulate learners.

Third, the correlation between diversity of chosen content categories and co-regulation constructs suggests that the more content categories the user reads or answers, the more active she is in performing the co-regulation process, vice versa. To understand this relationship, one can claim that it is likely that users who have read or answered more content categories, have a broader range of learning goals and more curiosity to discover the learning functionalities of PowerApp and experience a challenge-based learning. One possible way to satisfy this curiosity is playing duel-learning games. On the other hand, it can be said that the competition-based nature of duel-learning games might lead and push the game's peers to prepare themselves before starting the game by reading and answering more content categories available in PowerApp. Also, playing duel-learning games can reveal the users' knowledge deficiency in a particular content category and provide them with insight into their lack of knowledge. This insight might encourage them to read and answer more content categories to diminish their knowledge lack. From this perspective, it can be argued that defining and pursuing learning objectives in workplace settings follows a non-linear process and the co-regulatory process can be envisioned as means for regulating personal learning objectives. In this regard, Littlejohn, Milligan and Margaryan (2012) asserted that the traditional SRL models presents a linear and sequential learning process consists of *forethought*, *performance*, and *self-reflection* phases which differs from adult learning in workplace where "adults acquire a significant part of their competencies through transformations with open objectives in which goals and motivations are continually reviewed".

These findings suggest the below list of improvements in the design of this e-learning system:

- Defining more social learning activities and scenarios to improve both individual- and co-regulatory learning process.
- Feeding both individual- and social-based learning activities with similar types of content in order to make a close link between these processes.
- Providing appropriate level of choices for learners and allowing them to pursue their preferred ways of learning as a means to increase their social activeness. To do so, it should be noticed that the employees with higher level of regulation need more choices than others.
- Allowing the learners to observe other learners' learning activities.
- Supporting motivational aspects of regulation process by introducing more extrinsic (gaming elements) and intrinsic elements (i.e. curiosity-based learning).
- Increasing the usability of e-learning system through generating context-based and relevant content.

ISBN 978-963-89559-7-5

- Designing and implementing a learning analytic module to assist learners to get a clear picture of their learning process and pattern.
- Allowing more knowledgeable learners to participate in developing and evaluating content items.

References

1. Barnard, L.; Paton, V. and Lan, W. (2008). Online Self-Regulatory Learning Behaviors as a Mediator in the Relationship between Online Course Perceptions with Achievement. In *International Review of Research in Open & Distance Learning, 9(2).*
2. Boekaerts, M. (1999). Self-regulated learning: Where we are today. In *International journal of educational research, 31(6),* (pp. 445-457).
3. Grau, V. and Whitebread, D. (2012). Self and social regulation of learning during collaborative activities in the classroom: The interplay of individual and group cognition. In *Learning and Instruction, 22(6),* (pp. 401-412).
4. Huang, H.M. (2002). Toward constructivism for adult learners in online learning environments. In *British Journal of Educational Technology, 33(1),* (pp. 27-37).
5. Kim, B.; Park, H. and Baek, Y. (2009). Not just fun, but serious strategies: Using meta-cognitive strategies in game-based learning. In *Computers & Education, 52(4),* (pp. 800-810).
6. Littlejohn, A.; Milligan, C. and Margaryan, A. (2012). Charting collective knowledge: Supporting self-regulated learning in the workplace. In *Journal of Workplace Learning, 24(3),* (pp. 226-238).
7. Rahimi, E.; van den Berg, J. and Veen, W (2013). Investigating teachers' perception about the educational benefits of Web 2.0 personal learning environments. In *eLearning Papers, 35.*
8. Reeves, T.C.; Herrington, J. and Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. In *Journal of Computing in Higher Education, 16(2),* (pp. 96-115).
9. Schunk, D.H. (1989). Social cognitive theory and self-regulated learning. In B.J. Zimmermann & D.H. Schunk (eds.), *Self-regulated learning and academic achievement: Theory, research and practice,* (pp. 83-110). New York: Springer.
10. Shih, K.-P.; Chen, H.-C.; Chang, C.-Y. and Kao, T.-C. (2010). The Development and Implementation of Scaffolding-Based Self-Regulated Learning System for e/m-Learning. In *Journal of Educational Technology & Society, 13(1).*
11. Smith, P.J. (2003). Workplace learning and flexible delivery. In *Review of Educational Research, 73(1),* (pp. 53-88).
12. Stewart, J. and Winter, R. (1995). Open and distance learning. In S. Truelove (ed.), *The handbook of training and development,* (pp 201-234). Oxford: Balckwell.

ISBN 978-963-89559-7-5

13. Tynjälä, P. and Häkkinen, P. (2005). E-learning at work: theoretical underpinnings and pedagogical challenges. In *Journal of Workplace Learning, 17(5/6),* (pp. 318-336).
14. Volet, S.; Vauras, M. and Salonen, P. (2009). Self-and social regulation in learning contexts: An integrative perspective. In *Educational psychologist, 44(4),* (pp. 215-226).
15. Zimmerman, B.J.; Bonner, S. and Kovach, R. (1996). *Developing self-regulated learners: Beyond achievement to self-efficacy.* American Psychological Association.

ISBN 978-963-89559-7-5