Action research addressing work stress in primary education using Lean tools

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Abstract

Teachers of Primary Education experience high levels of stress. We examine the use of value stream mapping as a rational coping strategy for teams of teachers to overcome work-related stressors. The processes that have been selected by the teachers relate to coping with increased variety, long and uncertain throughput times, and unclear specifications of processes. The value stream mapping method has been adapted in order to make it useful for teachers without any background in lean. We show how this has enabled them to develop rationale coping strategies to reduce work-related stress.

Keywords: Value Stream Mapping, process improvement, service operations

Introduction

Work stress of teachers and other employees in education is a persevering problem as there are many factors that contribute. In American primary education, a study of Stauffer and Mason (Stauffer and Mason, 2013) showed that if a school had to use prescribed standardized tests that were not only used for monitoring progress of pupils, but also to compare the performance of individual teachers, this had a major impact on work stress among teachers. In a European study, (Antoniou, Ploumpi and Ntalla, 2013) state that teachers of primary education experience higher levels of stress compared to teachers of secondary education. Uncertainty or conflicts on their roles and tasks is a very important contributor to work stress, as well as the work load, time pressure, lack of autonomy and motivation, lack of a cooperative team culture, lack of public recognition and appreciation, and not enough involvement in decisions on tasks.

A major factor that might explain the perceived work stress of teachers is the availability and use of coping mechanisms. (Antoniou, Ploumpi and Ntalla, 2013) distinguish problem-focused coping mechanisms and emotional coping mechanisms. The latter is directed towards external recognition of the problem and its consequences, while the set of problem-focused coping mechanisms aims at addressing and solving the problem. We denote them as rational coping behaviours, which help teachers overcome work-related stressors and burnout and achieve their valued outcomes with their pupils.

Based on the observation that teachers often work in isolation without adequate support for personalized work methods from the organizational level due to limited resources, we expect that teachers do not have full access to problem-focused coping mechanisms and hence are not capable of addressing and solving the work stress problems themselves.

In industry, we have faced similar problems. However, empowering people at the shop floor has resulted in the development of very practical tools and methods that provide support to these people in identifying and resolving emergent issues in their daily work. One of these tools is Value Stream Mapping (Rother and Shook, 1999). It is a visual method that helps a team to first get consensus on the actual situation of a process (start, finish, steps, delays, actors, customers, sources, dependencies, control issues, et cetera), next to identify times and costs involved, denote problems and improvement suggestions, and finally to develop a future (desired) state of the process.

Reports on the actual usage of Value Stream Mapping in the Service Operations field of education are not available. Many papers that include cases report on the usage in production and distribution contexts. This raises the question whether the method needs to be modified in order to be applicable in the context of education. This study explores this question by developing and evaluating a Value Stream Mapping method for use in primary education.

The structure of the paper is as follows. The next Section describes the design of the study. The third section describes the development of the modified method. The fourth section its application in primary education. We end with conclusions.

Design of this study

This study examines the use of value stream mapping by a team of teachers of primary education as a rational coping mechanism in order to identify possibilities to reduce their work stress. We apply action research to describe and reflect on the steps taken. Action research with participative design is a well-known method for research (Coughlan and Coghlan, 2002; Altrichter, Posch and Somekh, 2005). It is a quite intensive research method of the social sciences in which the researcher is actively involved in resolving a relevant practical problem while at the same time reflecting on the research process and the role of the researcher itself. A cyclical stepwise approach (plan do check act) makes it possible to distinguish the various roles and provide outcomes that are scientifically useful and not just practically relevant.

The research has started with an extensive literature review of Value Stream Mapping and Work stress in education. Next, we developed a workshop format for the action research phase and a protocol for the observation studies that had to be accomplished. We decided that a small team of teachers, support staff and management would be best for this study. The team was composed of three lecturers, one educational specialist, and the director. Two of them were male, three female. Ages between 30-60. Their level of experience in education was extensive, as all participants had been working in the field of education since they started their career. However, some had worked in various schools.

Next we present a simplified value stream mapping approach for the educational context, as many of the symbols and approaches known in literature are too complex or detailed to be of direct use for a team of teachers with no previous education in lean tools. Finally, we describe the steps taken to identify and select processes, do observations, and use of the Value Stream Mapping method in workshops to resolve the work-stress related processes.

Value Stream Mapping for education

The application of Value Stream Mapping in education is rather uncommon. Only a few examples of its application have been described in the academic literature, e.g., (Alp, 2001; Narayanamurthy, Gurumurthy and Chockalingam, 2017). One of the reasons might be that practical applications of this method often are focusing on the improvement objective instead of the method. Another reason might be that literature on Value Stream Mapping is rather technical and includes terminology and standardized visual symbols that are very useful in transportation, storage, material handling, distribution, and complex industrial processes. However, this language field does not fit with other areas (Forno et al., 2014), such as education.

In this study we have developed a simplified Value Stream Mapping method for use in an educational context. The method has to be used by well-educated people, but without a background in lean problem solving, and should be useful as a tool in educational process improvement. A first step is the introduction of a limited set of standardized visual symbols to be used in the mappings. We propose to use a map-structure consisting of three layers:

- control layer (supplier, client, and internal controllers and control systems);
- process layer (start, finish, activities, dependencies);
- observation layer (measurements, disturbances, identified problems). See Figure 1.

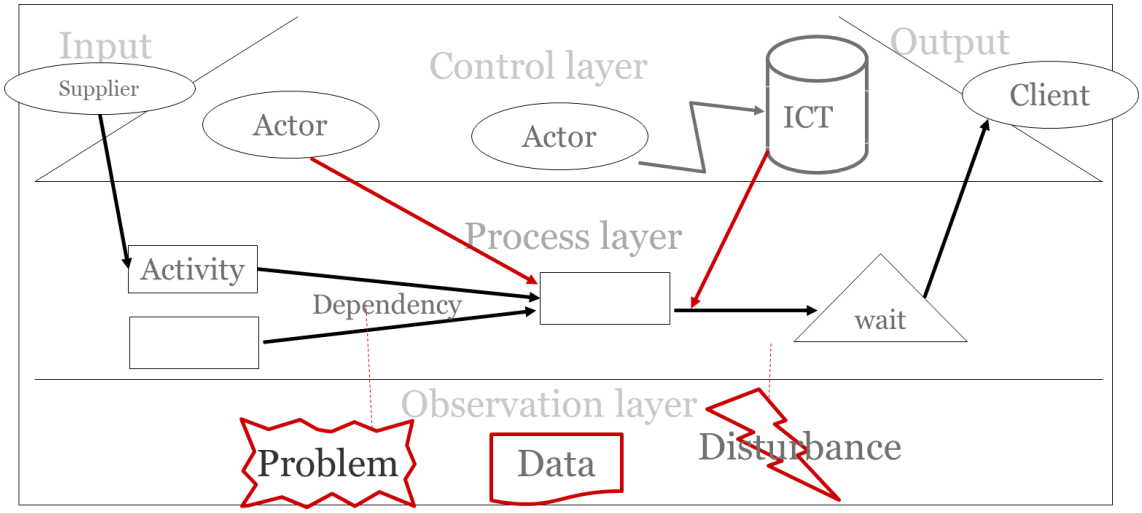

Figure 1 Value Stream Map for Education: structure and symbols

Note that we introduce far less specific visual symbols to distinguish and characterize activities as is usually done in Value Stream Mapping. However, the basic content is still there, with emphasis on the process flow in which value is being delivered and the connection with the information flow that initiates, monitors, and controls the process.

Addressing work stress using Value Stream Mapping

Identification and selection of work-stress causing processes

Lean schools aim to engage the people involved in the process to examine and improve the process as well (Riezebos, 2016). In order to address work stress among teachers, it is therefore essential to involve teachers and have them analyse what processes actually

cause work stress and might be useful to analyse. They came up with 14 processes. We developed a selection mechanism to identify which of these processes should be selected for the Value Stream Mapping approach.

The three selected processes relate to coping with increased variety, long and uncertain throughput times, and unclear specifications of processes. The increased variation of students makes it necessary to provide each child specific attention, assignments, and feedback. Hence we observe a change from batch production to one of a kind production. This has consequences for the preparatory activities (process 1) as well as the in-class activities (process 2). Next, the unclear specifications and handling of administration processes shows the need for improved standard operation procedures supported by appropriate ICT facilities (process 3).

In all processes, a returning factor is the dependency on external resources and the long and uncertain throughput times of requests for ICT support. This shows that boundary control and communication are essential instruments in coping with work stress.

Observation of work-stress-generating processes

The observation of the selected processes was accomplished by two methods: video-taping and audio-recording. Two processes have been video-taped in the regular work place of the teacher (i.e. at school), while we asked the teacher to explain during the task performance what he or she was doing. The last teacher did accomplish a task in-class, engaging with the pupils and monitoring their progress, hence video-taping would interfere with this process. Hence we decided to use audio recording and made some photographs of critical situations that occurred.

The observations have been accompanied with documents of the process, i.e., materials from the pedagogical methods used, background information from inspection, plans of the school, et cetera.

Value Stream Mapping workshops to analyse work-stress-generating processes

Every selected process has been addressed in a workshop with a length of 1.5 hours. The teacher that had been observed for that process was present in the workshop to provide further explanation, but was not involved in actually depicting the Value Stream Map. As the processes were relevant for the all teachers at this school, the resulting map was shared with the whole school team in order to gather feedback and input from them as well. In the next workshop we continued and updated the Value Stream Map based on their comments. The next step was to add measurements (task length, waiting times, et cetera), identify problems, and structure these problems. We structured the problems in three categories: preparation, execution, or inspection. Problems in the category preparation refer to activities that should have taken place in order to facilitate the current activity. Execution problems pop up during the execution of the task, but could not have been avoided by a better preparation. Inspection problems refer to the evaluation of the task, i.e. how to know whether it has been accomplished correctly or not. During the workshops we replaced the term inspection with reflection/evaluation, as inspection was associated with the formal inspection audits of government in the field of education.

The next step in the workshop was to identify possible solutions for these problems. We asked all participants to find solutions for each of the problems and to allocate the

solution in a matrix with four types of solutions: 1) Organisation; 2) ICT; 3) Personal; 4) Cooperation. This matrix could be extended if they had identified a solution that would not fit in one of these categories. During the meeting we examined problems of all three types (preparation, execution, and inspection). After the meeting, we invited other members of the school team to bring forward ideas for solutions as well and we finalised the matrix in the next meeting. The total list of solutions was then prioritized by the participants based on impact and expected efforts to realize the solution. One of the teachers took leadership in communicating the list of solutions to the other members of the school team, not by using a new value stream map, but by a visual representation of the solutions themselves. Many of the solutions communicated better through such a simple visualization. Moreover, ownership of the solution list was clear to everyone in the school.

The first two processes were addressed during in three meetings of 1.5 hour in total, including the basic introduction of the method, symbols, and matrices. The last process was addressed during a single meeting of 2 hours, including an evaluation of the whole approach.

Evaluation

The evaluation revealed that the enthusiasm of the team had increased during the weeks of using the method. The time they had to invest was limited to the five meetings, which was important as the problem they investigated concerned work stress, hence our solution method needed to limit the time they had to spend on it and bring forward a good return on their investment. They liked the structured approach where the method was leading in what to do and how to analyse it, but they themselves were leading in identifying problems and solutions. The role of the action researchers were focused on facilitating the workshop, clarifying the terminology and tasks in the Value Stream Mapping approach, performing the observation studies (which included preparations for the workshop), and reflecting on the learning process of the participants.

Conclusion

The Value Stream Mapping approach helps to reduce the throughput time using methods from Lean and Quick Response Manufacturing (Suri, 2010). We conclude that teams of teachers are able to develop rationale coping strategies to reduce work-related stress using Value Stream Mapping.

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