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DEVELOPMENT OF A CURRICULUM MANAGEMENT PROCESS BY APPLYING LEAN CONCEPT FOR WASTE ELIMINATION TO ENHANCE CURRICULUM IMPLEMENTATION OF PRIMARY SCHOOL TEACHER

Abstract

This research aims to study and develop a curriculum management process by applying Lean concept for waste elimination to enhance curriculum implementation of primary school teacher. This study was conducted with a focus on qualitative data collection by dividing into 2 phases, including (1) analyze and synthesize relevant notions, theories, documents, and researches, as well as fundamental information used for developing a process, and (2) develop a curriculum management process by applying Lean concept for waste elimination, including 7 steps (preparation, value definition, value steam mapping, waste eliminations, flow implementation, pull reflection, and pursue perfection).

Keywords: Curriculum management, Waste in Education, Quality in Education, Lean Concept

Introduction

Developing institutional curriculum is a process requiring participation from all sectors, such as management, teachers, guardians, and communities. Its implementation can be generally divided in 2 parts, including (1) institutional-level implementation, and (2) class-level implementation. Consequently, learning activities or assignments for students, materials, or assessment approach may be adjusted to suit each group of students (Office of the Basic Education Commission, 2010).

People dealing with curriculum management and technocrats believe that curriculum management is curriculum director or manager's role (Ninwichien, 2005). However, the definition of curriculum management also covers instructional personnel required to be responsible in applying and modifying learning standard to design and develop a curriculum or program consistent with philosophy and goals of such curriculum. It is required to determine and develop a time frame for applying such curriculum, as well as to arrange continuous monitoring of such curriculum to be applied as framed and to help students achieve its determined objectives (Thongthew, 2010).

A teacher plays directly important role in developing students to grow up as quality citizen of the nation. According to research regarding school efficiency (Kyriakides et al., 2002), a teacher is a key factor resulting in students' learning development. It can be said that the quality of students' achievement significantly depends on a teacher. Teacher efficient in instructional arrangement will enable students to fully learn and develop themselves. However, regarding a report on curriculum use in Primary Educational Area 2 in Samut Prakarn Province, Thailand, in terms of problematic conditions, it is found that each teacher's instructional

arrangement is done individually. Educational standard has not been truly used for designing instructional management (Primary Educational Area 2 in Samut Prakarn Province, 2010). This overall creates non-directionally instructional management, lack of coordination, and lack of understanding on core objectives for each subject.

Primary-level instructional management in Thailand is consistent with the Core Curriculum Management for Basic Education 2008, focusing on standard and learning implementation, as well as application of knowledge assessment and evaluation by the central unit, the National Institute of Educational Testing Service (Public Organization) or NIETS. However, teachers do not share common understanding and cannot develop an instructional plan in relation to all targeting aspects (knowledge, competency, and desired characteristics). The details are overlapping and do not cover all issues determined in the standard (Office of the Basic Education Commission, 2010).

An instruction focusing only on contents without truly considering instructional management's targets, assignments inconsistent with curriculum's targets, time wasting in repetitive instruction, inefficient resources use for Instructional management are all economically considered systematic waste which is consistent with educational waste defined by U.S Government Accountability Office (U.S Government Accountability Office, 2011) in a research finding 2 types of education wastes, including wastes from duplication & overlap, and waste from fragmentation. This is also agreed by Dewey (1990 [1902]) who stated that (1) students' development must cover all areas, including physical mental brain and emotional aspect so one-focused instruction may impede students from other areas of development causing waste and students' inability to develop in all areas determined for desired characteristics as preferred values, (2) waste caused by the inconsistency of educational management by subject in school and loss of students' capability to learn from reality displaying problems occurring in working process and requiring to be solved by reducing wastes in process and increasing work efficiency. According to relevant documents and researches, it was found that Lean concept is a management for waste and overlaps elimination to directly achieve targets and is the most responsive work to users in bringing their satisfaction (Peeravud, 2010).

Lean waste elimination was derived from Taiichi Ohno in 1978, studying companies' mistakes to reduce car production waste, so called Toyota Production System (TPS), and then was further developed by Shigeo Shingo in 1981. Although Lean started from car production, its concept has been well applied to service system, particularly within an organization with customers-oriented value. Consequently, Lean has been widely used in various globally leading organizations (Ziskovsky & Ziskovsky, 2007). There are 5 Lean's key concepts, including identify value, map the value stream, create flow, establish pull, and seek perfection. It is flexible and adaptable to each organization's specific needs for curriculum management in various ways.

As one of service businesses, Lean waste elimination was firstly introduced to educational sector in 2004, from higher education institutes. There was a research regarding the application of lean waste elimination for production to each process within several organizations (Balzer, 2010). In addition, Flumerfelt (2008), a professor from Oakland University in Australia, conducted a study supporting that the introduction of Lean waste elimination to educational institutes is possible

because Lean focuses on system and process development. In Thailand, Lean waste elimination has been widely applied in various types of business but its concept has never been applied to educational system.

Objective: To develop curriculum management process by applying Lean concept for waste elimination to enhance curriculum implementation of primary school teacher.

Research Methodology

Phase 1: To study, analyze, and synthesize notions, theories, documents, and research, including basic information regarding curriculum management process and lean waste elimination concepts, in order to develop process which consists of 3 steps: study of waste resulted from the application of curriculum by primary school teacher, study of notions regarding efficiency of curriculum application, and application of notions passed through analysis and synthesis to create curriculum management process based on Lean waste elimination concepts.

Phase 2: To verify the developed curriculum management process by having 5 experts: 2 in curriculum management, 2 in educational institute management, and 1 in Lean waste elimination concepts, and using a form to evaluate process appropriation to see relation and accuracy in terms of contents.

Phase 3: To finalize curriculum management process based on process appropriation evaluation form and expert's recommendations.

Result

1) Study results show that the way that a teacher put curriculum into practice was not consistent with curriculum's objectives, potentially causing waste in 2 periods of time, including when developing learning management plan and when putting it into practice.

2) According to results from the verification of curriculum management process based on Lean waste elimination concepts by 5 experts by using process appropriation evaluation form to see consistence and accuracy in terms of contents. Notion, principles, objectives, work processes, and duration can be presented as following final procedures.

Notions

Curriculum management process based on Lean waste elimination concepts is a process to effectively apply curriculum, by focusing on goals determined by the Core Curriculum Management for Basic Education 2008, students' quality and local contents in each educational area, institutional curriculum targets, as well as target set for each instructional arrangement, considering consistency in all work processes to minimize waste. Waste caused during curriculum application takes place in 2 periods of time, including when developing learning management plan and when putting it into practice. Consequently, the determination of person in charge for managing waste when having group work is required for continuous collaboration and improvement to efficiently apply curriculum or put it into practice most consistently and achievably.

Principles

Curriculum management process based on Lean waste elimination concepts to enhance efficiency of curriculum application consists of the following principles.

1. Recognition of the importance of target-oriented implementation based on goals set for each time of instructional arrangement by thoroughly considering each process to minimize waste.
2. Determination of concrete and clear target must be simple, measurable, achievable, reasonable, and trackable.
3. Development of value chain is a concrete process allowing relevant parties to see clear picture overall in order to share common understanding on targets.
4. Implementation process-by-process includes activities consistent with instructional arrangement target which are value-creation activities, and activities inconsistent with target are non-value creation where such kind of process must be eliminated.
5. Searching for waste must focus on process itself, not on person.
6. Determination of a group of persons in charge must be appointed from a group with relationship to build shared responsibilities and to seek for approaches to improve responsible tasks.
7. There is no limit for efficiency enhancement process. It must be gradually and continuously implemented in cycle to seek for better approach at all time.

Work processes

Curriculum management process based on Lean waste elimination concepts includes 7 steps.

Step 1: Preparation

Preparation is a process to determine strategy and structure to support changes into management by applying Lean waste elimination concepts, and to develop a team including team building and training to gain knowledge and capabilities in correctly and effectively applying curriculum management process based on Lean waste elimination concepts. Key characteristics of team are relationship and shared responsibility. One can become a member of more than one team and several teams can work concomitantly. Determination of a team with relationship can be made from teachers mutually responsible for the same subject matter, the same class, or the same project.

Team training can be divided into 3 phases including pre-trial, trial, post-trial phase.

Step 2: Value Definition

Academic management committee of an educational institute mutually identified needs for curriculum application under curriculum management process on the basis of SMART: Simple, Measurable, Achievable, Reasonable, and Trackable. There were following sub-processes:

1) Academic management committee mutually identified needs showing efficiency of curriculum application based on information of the core curriculum for basic education, guidance for student quality evaluation from external quality

assessment, institutional curriculum, identity and uniqueness of each school, as well as community's and relevant stakeholders' needs.

2) Academic management committee took needs for verification and adjusted them as needed for curriculum management.

3) A teacher verified target set for instructional arrangement based on SMART principles.

Step 3: Value Steam Mapping

The creation of value chain is to create overall work plan by Curriculum Manager or Lean Master, responsible a role as leader, whereas a teacher is a performer. Sub-processes are as follows:

1) Draw a flow chart based on target per hour set.

2) Analyze current work in comparison to all targets per hour whether they are consistent and cover all targets of institutional curriculum.

3) Analyze should there be any inconsistent and missing target which is considered implementation waste and must be improved further based on Lean waste elimination.

Step 4: Waste Elimination

Waste elimination was determined to seek for waste within a work plan and waste obstructing the value chain from achieving the determined targets, covering the following sub-processes:

1) Seeking for waste: a team collaboratively seeks for wastes by applying familiar and appropriate approach.

a. Analysis under 5 WHYs principle to analyze a root of waste by continuously asking "why" until cause of problem is apparent.
b. Visual control is the use of observer's eyes to find wastes within implementation processes and then to write them down one-by-one.
c. Brainstorming is to analyze wastes by using group work which must collaboratively think and analyze from real practices whether any process or step is valuable (NA) or non-valuable (NVA).

2) Division of waste: a team cooperatively considers and divides found wastes for division, as follows:

a. Divide wastes into resolvable (MUDA Type I) and non-resolvable (MUDA Type II) waste.
b. Take educational resolvable wastes for dividing into 7 sub-groups: Excess Processing, Over Production, Not utilized employee, Using more assets, Unwise use of time, Duplication and Copying, and Fragmentation.
c. Identify waste elimination approaches whereas Curriculum Manager must provide advice to a team by applying questioning techniques and ERCS:

E = Eliminate	(Eliminate unnecessary process, content, or student's task)
R = Rearrange	(Rearrange instructional steps and contents)
C = Combine	(Compile steps, contents, and student's task together)
S = Simplify	(Make steps, contents, and instructional management approach simple and easy to understand).

Putting plan into practice (Hoshin Kanri) is to draw abstract picture into more apparently concrete plan with the verification whether a plan is concrete and practical, whether it will lead to target achievable at its completion, whether there would be any adverse outcomes.

Step 5: Flow Implementation

This step is to put instructional arrangement plan into practice. This plan is considered valuable as it tends to be applied to satisfy the desired goals with minimum wastes. In doing so, there are relevant parties, including teachers or plan users and instructional observers in the same team as plan users. This is also to verify whether plan users followed the plan and the real practice produced any other wastes during the use of such plan or not. Then, the observations will be used as information for discussion, review, and reflection further.

Step 6: Pull Reflection

This step is to review work in which a team will have a meeting, consultation and reflection session by analyzing steps of putting them into practice as sub-processes. In addition, a team will collaboratively whether in such processes there are any remaining waste affecting target achievement or not. If any, a team will pursue Kaizen to eliminate such wastes and to improve instructional management to have unlimited increase of efficiency, such as time reduction, resources elimination, quality enhancement, or increase in number of targets.

Step 7: Pursue Perfection

In this step of value creation, all Kaizen projects will be integrated as organization results to bring success occurring in each step as working standards. There will be knowledge sharing and success cases compilation to be further used as concreate working standards.

Process timeline

Curriculum management process based on Lean waste elimination concepts can be concomitantly implemented. One can be a member of several groups. A period of first round must be equal to period set by a group (Takt Time), covering 4 weeks. Further, step 3-5 will be continuously implemented for 4 rounds in total to determine standard value. Then, standard values will be compiled for summarizing as overview of procedures. The total period taken for all procedure will include 20 – 24 weeks. However, the period can be adjusted as appropriate based on each educational institute's context. Also, the period taken can be varied based on the level of difficulty of objectives determined by each educational institute.

Conclusion and Recommendation

Curriculum management process based on Lean waste elimination concepts is a research and development. Therefore, once final procedure passed quality verification by experts, it can be further practiced by primary school teacher, both in private schools or schools under the Office of the Basic Education Commission of Thailand.

The result shows that, in terms of potential waste elimination, there were several principles and notions which were consistent and can be combined for developing

curriculum management process based on Lean waste elimination concepts in 7 steps: preparation, value definition, value steam mapping, waste eliminations, flow implementation, pull reflection, and pursue perfection.

References

Balzer, W. K. (2010): *Lean Higher Education: Increasing the value and performance of University Processes.* New York: Taylor & Francis Group.

Cretchley, P. (2009): COAST Maps: A simple visual tool for articulating key elements of the first-year learning experience within course development. *e-Journal of Business Education & Scholarship of Teaching*, 3, 21-28.

Dewey, J. (1990 [1902]): Waste in Education. In J. Dewey: *The School and Society*. Chicago: University of Chicago Press, 63-94.

Flumerfelt, S. F. (2008): Is lean appropriate for schools? In S. Flumerfelt (Ed.) *White papers*. The Pawley Lean Institute. http://www4oakland.edu/?id=4709&sid=12. Accessed 27 February 2015.

Kyriakides, L., Combell, R. & Christofidou, E. (2002): General criteria for measuring teacher effectiveness through an evaluation approach: A complementary way of measuring teacher effectiveness. *School effectiveness and school improvement*, 3, 291-325.

MCREL (2003): Curriculum Mapping: A Process for Continuous Quality Improvement. *Notes & Reflections*, 4.

Ninwichien, H. (2005): *School-based Curriculum Development: Principle and Practices.* Pattani: Educational Technology Department, Prince of Songkhla University Pattani Campus.

Office of the Basic Education Commission (2009): *Curriculum Issues 2009*. Bangkok: Thai Agricultural Cooperative Printings Co., Ltd.

Office of the Basic Education Commission (2010): *Practices of Assessment and Evaluation of Curriculum Learning Based on the Core Curriculum for Basic Education 2008, 2*. Bangkok: Thai Agricultural Cooperative Printings Co., Ltd.

Peeravud, S. (2010): *Presentation Material for Thailand Lean Award 2010*. Bangkok: Technology Promotion Institute (Thailand-Japan).

Primary Educational Area 2 in Samut Prakarn Province (2010): *Report on Results of the Application of the Core Curriculum for Basic Education 2008 (Ready School)*. http://202.143.169.210/samutprakan2/. Accessed 27 February 2015.

Thongthew, S. (2010): *Course Materials for Subject Code 2716851 Curriculum Management and Instruction.* Bangkok: Chulalongkorn University.

U.S. Government Accountability Office (2011): *Opportunities to Reduce Potential Duplication in Government Programs, Save Tax Dollars, and Enhance Revenue.* http://www.gao.gov/products/GAO-11-318SP. Accessed 1 March 2011.

Willett. G. T. (2008): Current status of Curriculum mapping in Canada and the UK. *Medical Education*, 42, 786-793. UK: Blackwell Publishing.

Ziskovsky, B. & Ziskovsky, J. (2007): *Doing more with less - Going lean in education.* A white paper on process improvement in education. USA: Lean Education Enterprises.

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