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Theorizing lesson study: Integration of action research methodology in Japanese lesson study approach

Global challenges faced by teacher researchers outside of Japan are related to theoretical, practical knowledge, research methodology, success and sustainability of adapted lesson study (LS) projects. These issues highlight the necessity of in-depth theoretical research of authentic Japanese lesson study (JLS) approach. The purpose of the article is to explore LS theorization through theoretical analysis of multifaceted structure of JLS components and integration of action research (AR) methodology in JLS to make LS evidence-based and comprehensible. The main idea is theorization of LS through modeling, evaluation checklist and conceptualization of LS philosophy. As a result of comparative, analysis and synthesis, structured analysis and modeling research methods, multi cyclical LS model integrated with AR methodology, evaluation checklist used as assessment tool for model realization and LS philosophy were developed. The model and checklist are used to describe 4 LS as AR stages (pre-diagnostic, intervention, post-diagnostic and knowledge construction) and 37 components. The model is significant to get theoretical knowledge acquisition, the evaluation checklist is crucial in practice as self-correction, self-assessment and self-regulation tool. They can be utilized by teachers throughout LS process. The research findings contribute to developing LS methodology with a set of assessment criteria to make LS scientifically grounded research.

Keywords: Japanese lesson study, action research, lesson study as action research, lesson study philosophy, action research methodology, lesson study components, lesson study model.

Introduction

The State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020–2025 set up requirements to modernize teacher education and pedagogical practice focused on continuous professional development (CPD) through implementation of Lesson Study (LS) and Action Research (AR) approaches [1]. In spite of the fact that LS and AR projects were launched and trained in Kazakhstan under the leadership of Cambridge University [2], Kazakhstani teachers face challenges related to theoretical knowledge, research methodology and practical implementation [3]. Worldwide issues that are raised in Denmark, US, Malaysia, Ireland, Turkey, UK, Portugal are how to gain an in-depth understanding of LS theory, practice, interconnected LS systematic structure, research methodology, success and sustainability [4, 5].

Originated in Japan since the 1870s [6], LS is exclusively conducted in educational institutions as “a cycle of teacher instructional and student learning improvement” [7]. LS boom started after the publication of “The Teaching Gap: Best Ideas from the World’s Teachers Improving Education” [8] and attracted international attention from foreign researchers as a successful Japanese method of designing effective lessons focused on teachers’ instructional classroom teaching as well as students’ independent learning and knowledge progress. It spread worldwide with its adapted and contextualized variations, forms, models, projects and case studies based on team teachers’ collaborative research lesson activity [9, 10, 11]. However, the dynamic global tendency of LS practical implementation generally accentuated on cyclic and step-by-step movement of teacher-led activity without deep theoretical and practical knowledge of the essential components, categories and cultural principles of JLS. This direction made contextualized LS models less effective, distinct and different from Japanese original [12, 13].

Different countries’ LS case studies adapted to their specific cultures, norms, beliefs and situations without detailed comprehensive analysis and synthesis of Japanese teaching culture lead to modification of cultural practice which differentiates adapted LSs from JLS. This aspect may influence positively fostering LS transformation or negatively in terms of misunderstanding of original JLS approach [4]. Contextualized LS models mostly accentuated on teacher professional development, improvement of teaching and learning on the basis of case studies and learner-centered instruction [14] rather than on how first to learn complex

and unique components of JLS steps such as 1) *kyozai kenkyu* — “a deep research study” of subject content, curriculum, tasks, teaching aids and other resources addressed research theme, in other words how to thoroughly structuralize and design lesson plan through numerous data sources; 2) *jyugyou kenkyuu* “lesson study” — how to hold the research lesson on the basis of teaching through structured problem solving instruction; 3) the obligatory inclusion of “*koushi*” that is a close collaboration of LS team members with professional experts as “knowledgeable others” highlighted as great advisers and guiders during planning and post-lesson discussion stages [10, 12, 14]. The hidden structure of JLS also uncover such teaching gaps as structured problem solving instruction, anticipating student thinking, teacher’s task, board and desk instructional practice focused on contextual and situational task design, dialogic and discussion-oriented interaction between teacher and students [9, 14].

Under-theorized LS is the main challenge faced by non-Japanese researchers that is needed to be studied theoretically and methodologically since JLS framework, progress and sustainability is not visible in contextualized LS models [4, 10].

Therefore, to address the above mentioned issues, the given article explores two aspects thoroughly: JLS structure in detail as well as integration of AR methodology in JLS in order to theorize LS. As the main products, it presents a comprehensive model of LS approach integrated with AR methodology and evaluation checklist of the whole LS as AR process.

Problem statement. The issues mentioned above formulate the main problem statement of exploring complex structure of JLS interrelated with AR methodology that contributes to theorizing LS approach.

The purpose of the article is theoretical and methodological investigation of JLS approach in integration with AR methodology to make it evidence-based and comprehensible for non-Japanese teacher-practitioners.

As a sustainable and organic system of designing, teaching and discussing LSs, based on both teachers’ instructional teaching and students’ content and thought process, JLS improves student independent learning and broad educational values [10]. It focuses on such central features as collaboration, student observation and reflection [15]. The main reasons for JLS success are its crucial point to enhance learner education through teachers’ systematic structured problem solving instruction method incorporated and discussed at nearly every LS step.

JLS progress in teacher and learner education shed the light on developing various adapted LS models, case studies, projects, innovative forms of LS throughout the world, for instance, a model and form of LS developed by Takahashi A., McDougal T. is collaborative research lesson (CRL) [14]. Such LS variations led to conceptualizations of numerous definitions of “lesson study” term such as “professional collaborative learning approach” [7, 11], “scientific research activity with its unique methodology leading to constructing theoretical knowledge and curriculum development in teacher education”, “LS as methodology” [15], “professional development method to resolve educational research questions” [9, 12], a model of Japanese professional development [5, 11], “a research method and in-school training” [5, 9], “a form of team teachers” practical learning and training in collaboration with outside observers and LS professionals’ and “knowledge generation approach to develop curriculum and professional learning community (PLC)” [11]. Accordingly, the multiple LS terms confirm multidimensional and complex characteristic feature of LS.

Dudley P. and Austin L. regard LS as “a highly specified form of classroom action research (CAR)”, aimed at enhancing teacher learning, CPD and practical knowledge in classroom environment [6, 16]. Wake G. and Seleznyov S. consider LS as “activity and collaborative action research” [17]. Consequently, the question arises whether AR methodology can be integrated in JLS despite the fact that both of them as original approaches, processes and scientific activities have their own historical background and distinct structure. To address the issue, similarities and differences, integration and interrelation of the two approaches were identified on the basis of literature review.

As for similarities, both AR and LS consist of unlimited spirals or cycles each of which encompasses planning, teaching/taking actions, observing/data collection and reflective analysis based on problem-posing, problem-solving, observational and process-oriented research actions aimed at improving and transforming teaching and learning education, the final product of which is constructing new argumentative theoretical knowledge. Moreover, they can be empirical studies including research questions or hypothesis needed to be explored deeply by team members in the light of critical, self-critical and constructive feedback, reflective, self-reflective, evaluative data analysis and reflection. Another essential commonality lies in long-term and collaborative nature of LS and AR inquiry-based process through which team teachers build PLC to reinforce a professional dialogue focused on designing creative lessons, improving student learning outcomes, generating innovative models of curriculum aims and principles. These ongoing research actions eventually

contribute to transformation of teacher education. The main products of AR developed from long term research process are knowledge construction, improvement and transformation of teaching and learning practice [18] which are similar to LS products [14, 15].

As for differences, LS is a pedagogical progress oriented process whereas according to Posh P., AR is a general term for almost all research processes [19] to build theory from practice. It dates back to the social psychologist Lewin K. who designed a social AR to develop intergroup relations to study industry, military, political and economic systems inquiry [20]. It can be implemented in the individual, one-to-one, group-based form [21] in different spheres of social sciences, applied linguistics, medicine, business, education and psychology. Later, Elliot J. proposed AR model for teacher education as a key indicator for teachers to investigate teaching and learning process on the basis of problem-based research questions. The response of research questions can shed the light on constructing theoretical arguments which is crucial to transform pedagogical culture, norms and beliefs [22].

AR has a large family with its different types such as technical, emancipatory, practical, classroom, critical participatory, educational, collaborative, pedagogical [23], whereas LS is contextualized and adapted to different countries' social and cultural peculiarities and classified into school, district and national level [24]. What differentiates LS from AR is that an essential part of LS is "a live research lesson" in which teacher's research lesson is shared with outside observers and novice teachers as a learning platform to observe, discuss, reflect and evaluate student and teacher interaction, students' actual subject content knowledge in authentic classroom environment. It can also be a teaching platform for experts to share tips and hints, comments and advice to make next LS cycle more effective [25].

All in all, despite the fact that LS and AR are interconnected with each other as cyclic and problem solving professional development process, each of which has its own peculiarities in its structure as a unique, one-of-a-kind research approach.

Regarding integration and interrelation of LS and AR, researchers argue that LS can be a specific form of practice-based classroom, cooperative, educational and collaborative AR since methodology of LS includes these AR types and has more commonalities in its cyclic research design. On the basis of AR methodology with a mixed method research, LS can be applied as long-term "*second-order AR design*", based on Elliot's argument, the so called second-order inquiry in which the central focus is on how team members reinforce their reflective skills by giving feedback and solving educational problems in the context of curriculum requirements and learner needs [26]. From Wake G. and Seleznyov S's perspectives, LS is a form of "*collaborative practitioner AR*" of teachers as researchers with the aim of developing teacher education and student thinking according to curriculum disciplines [17]. Moreover, LS can be "*a cooperative AR process*" and serve as a basis for constructing and reconstructing new theories from long lasting systematic practice-based research. In this sense, teacher practical thinking and knowledge (theoretical and procedural knowledge, emotions, beliefs, attitudes, social and cultural values) is theorized and theory is reconstructed through LS experiment held throughout many years [19]. For instance, structured problem solving, learning how to learn, curriculum development and long-term theoretical teaching approaches are the main products of JLS developed from sustainable Math education [15].

Since LS and AR approaches are interrelated and integrated with one another and have more similarities than differences except the complex invisible JLS structure, the article focuses on theorizing LS through the lenses of JLS framework and integration of AR methodology in JLS approach.

Methodology. Theoretical methodology of LS proposed by foreign theoreticians is:

- specific common features of LS and AR in the context of collaborative, multi cyclical, problem solving, reflective, evaluative, knowledge generating approaches [14, 15, 17, 18, 23, 27];
- theorization of LS focused on original JLS approach [4];
- multidimensional structure of JLS as professional development process [4, 10, 14].

Despite the abundance of LS literature, non-Japanese researchers do not fully comprehend to what extent various contextualized LS models are effective and sustainable, how to structuralize multifaceted LS process to put into effective practice. To make such multifunctional JLS approach comprehensible for foreign teacher researchers it is necessary to investigate complex structure of JLS steps in the context of AR methodology.

Therefore to address the issue, **two theoretical research questions** are formulated:

1. What are the productive ways of theorizing LS to make it comprehensible and evidence-based for non-Japanese teacher practitioners?

2. To what extent is integration of AR methodology in JLS approach through LS as AR model and evaluation checklist effective to theorize LS?

Throughout the research process, such theoretical research methods were implemented as comparative method, analysis and synthesis, structured analysis and modeling. As a result of theoretical and methodological literature review analysis, philosophy of LS was conceptualized, multi cyclical LS model integrated with AR methodology, evaluation checking list involving LS as AR stages and components of JLS steps were developed by the author. The model consists of four interrelated investigation stages (pre-diagnostic, intervention involving periodic cycles, post-diagnostic and knowledge construction) and five steps (concrete goal setting, LS planning, conducting LS focused on SPSA, post LS discussion and reflection) [9, 27, 28, 29]. The evaluation checklist, elaborated according to the LS model, includes 37 LS components with their step-by-step research actions explained and evaluated from start till the end of the research. The products will contribute to better LS theoretical knowledge acquisition and practical application thus will make LS as AR process clear, measured, sustainable and scientifically grounded.

Materials and methods

To identify to what extent LS approach can be theorized through AR methodology, analysis and synthesis method was employed to theoretically investigate integration and interrelation of LS and AR cycles. The theoreticians' cyclic steps were categorized in Table 1 to determine similarities and differences of the two approaches [6, 8, 9, 11, 20, 28, 30, 31, 32, 33, 34].

Table 1

Comparison of lesson study and action research cycles

Action Research Spiral or Cycle	Lesson Study Cycle
Planning-fact-finding-execution-analysis (Levin K.)	Preparing: identifying problem, setting a goal and planning a lesson (kyozai kenkyu) — teaching the lesson and student observing (koukai/kenkyu jyugyo) — reviewing the lesson; evaluation, results of the lesson (jugyo kentoukai) Jw. S., Hilbert J., Isoda M.
Strategic planning-observing, evaluating and self-evaluating-monitoring, evaluating and self-evaluating-critical and self-critical reflection (Zubber-Skerrit O., 2003)	Eight steps of LS: identifying problem statement-planning lesson study-teaching the lesson-evaluating and reflecting on the lesson-revising-teaching the revised lesson-evaluating and reflecting-sharing results
Planning-taking actions-observation- reflection (Kemmis S., McTaggart R., Nixon R., 2014)	Japanese original LS cycle: goal setting-lesson planning-research lesson-post-lesson discussion-reflection (Fujii T. et al., 2014)
Defining problem-needs assessment-hypothesis ideas — developing action plan-implementing plan-evaluating action-decisions (reflection, explanation and understanding action (McKernan J., 2013)	Plan-do-check-act (PCDA) JLS model operated at individual, group and school levels
Eight step AR model: formulating the problem statement met the specific criteria requirements-preliminary discourse about formulation of research questions or hypothesis — literature review on AR methodology on the basis of theory and practice-planning AR design, establishing a set of criteria, testing preliminary hypothesis-conducting AR process-regulating and recording-data collection analysis, feedback, evaluating and reflecting- AR assessment with a set of criteria, disseminating findings. Each step is accompanied with reflection and self-reflection. (Cohen L. et al., 2002)	The UK: Iterative LS cycle: 1. Set goals and plan jointly LS1. 2. Teach and observe LS1. 3. Interview ABC case students. 4. Hold a post LS1 discussion and plan LS2 (Dudley P., 2014) [6] The USA: Lewis's iterative LS cycle: curriculum study and formulation long term goals-planning (developing instruction plan including long term goals, prediction of student thinking, data collection plan, learning trajectory model, rationale for selected approach) — conducting research lesson (student observation, data collection) — reflection (data analysis on conducted research lesson, student responses, documentation) (Lewis et al., 2006)

In order to identify whether AR methodology is effective to theorize LS approach, similarities and differences of LS and AR were comparatively analyzed, through comparative research method (Table 2) [6, 7, 9, 23, 24, 31, 35].

Similarities and differences of LS and AR approaches

Differences: Action Research	Differences: Lesson Study
An umbrella term for all research processes employed in linguistics, medicine, business, education and psychology, etc.	Characterized with numerous terms such as a method, professional development process, scientific research activity, methodology, model, approach exclusively conducted in educational institutions
Individual, pair, group based AR form specified with different AR models, ethical principles, development of AR proposal, etc.	Team oriented research process with complex and invisible structure, a form of action research, central part of which is a live research lesson designed, conducted and discussed throughout the whole cycle. Documentation includes LS instructional plan, LS proposal, session protocols, etc.
Non-linear iterative spirals or cycles aimed at improving teaching and learning practice, curriculum standards for social transformation and democratic justice	Adapted iterative cycles modeled according to different cultural, social situational norms, beliefs and values aimed at enhancing teachers' instructional teaching and learners' cognitive, creative, independent learning and broad educational values
Types: technical, emancipatory, practical, classroom, critical participatory, educational, collaborative, pedagogical	Conducted at school, district and national level, a form of practice-based classroom, cooperative, educational and collaborative action research
Similarities: Lesson Study and Action Research	
Action research process, approach, methodology	
Problem-posing, problem-solving, observational, process-oriented, reflective, evaluative, systematic, collaborative, cooperative, multi-cyclic research actions aimed at improving and transforming teaching and learning education	
Knowledge construction, curriculum development, improvement and transformation of teaching and learning practice, building a collaborative learning platform for CPD and PLC.	

The research method of theoretical modeling was used to create LS model on the basis of JLS approach and AR methodology. Structured analysis method was employed to structuralize the multifaceted complex structure of JLS within AR stages. JLS structure was not fully visible in the LS model presented in general. Therefore, it was necessary to develop a large-scale evaluation checklist as a guidance to undergo a practical research and objectively assess the overall LS structured framework. The model and evaluation checklist are used in combination and introduced as core products to support theorization and practical employment of LS in the context of AR.

Results and discussions

Theoretical research findings obtained as a result of rigorous theoretical and methodological analysis to respond to the first research question are that productive ways of theorizing LS are operated through development of: 1) multi cyclical LS model incorporating integration of JLS approach and AR methodology to make LS approach measurable and evidence-based, 2) evaluation checklist including 37 JLS components within 4 LS as AR stages and 5 JLS steps, 3) conceptualization of LS philosophy.

The multi cyclical LS model constructed on the basis of JLS approach and AR methodology is made up of four stages:

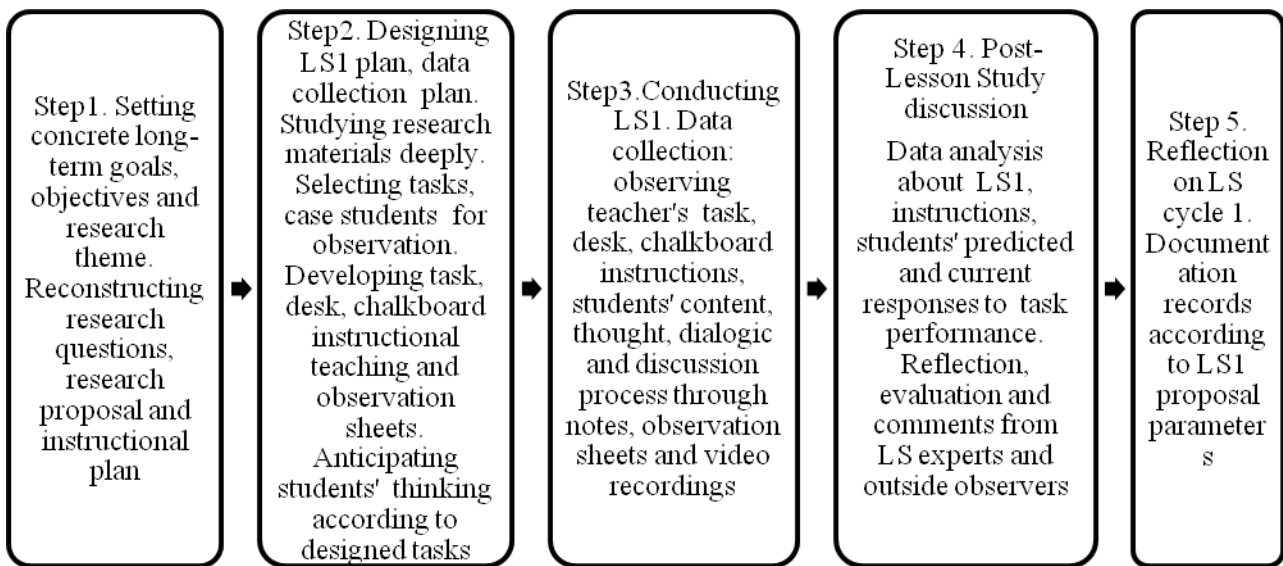
- I. Pre-diagnostic stage and developing LS documentation
- II. Intervention stage
- III. Post-diagnostic stage
- IV. Knowledge construction stage (Table 3).

Table 3

Lesson Study model on the basis of Japanese lesson study approach integrated with action research methodology (adapted from Isoda M. et al. [29], Lewis C. et al. [7], Isoda M. [9], Lewis C. et al. [35], Fujii T. [10], Takahashi A., McDougal T. [14], Pjanić K. [15])

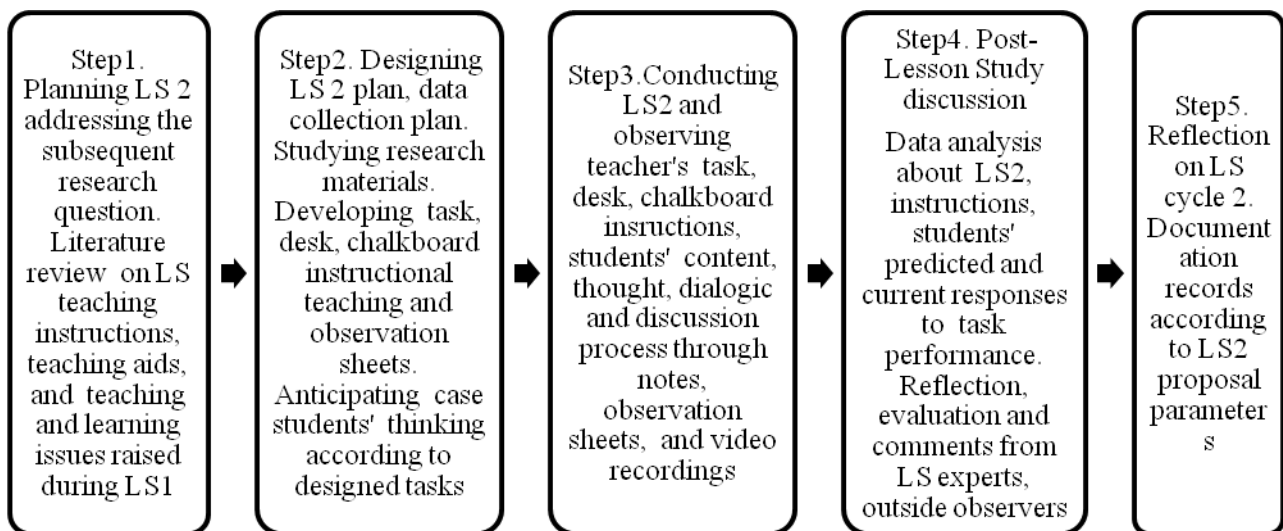
Stage1. Pre-diagnostic research design and developing LS proposal. Building a team and selecting a class. Identification of problem statement, formulation of the main research question through data analysis of the research methods such as subject test, questionnaire and interview. Developing ethical principles, LS proposal, LS schedule and instructional plan. Systematic literature review.

Stage2. Intervention
Lesson Study cycle 1



Taking subject test to identify the level of students' academic performance, formulating a sub-research question

Lesson Study cycle 2



Taking subject test to identify the level of students' academic performance, formulating a sub-research question

Conducting iterative cycles to deeply explore research questions and enhance LS productivity and sustainability

Conduct a series of LS cycles since one or two cycles are not enough to address teaching and learning issues, create knowledge and develop teachers' observation, research and reflective skills

Stage 3. Post-diagnostic stage of data collection and analysis through the same research methods taken at the pre-diagnostic stage. Comparative analysis of pre and post-diagnostic research findings, triangulation design, evaluation and reflection on the overall LS as AR process

Stage 4. Generating knowledge claims or theoretical argumentations from qualitative or quantitative or mixed method research findings. Justification of their validity, reliability and legitimacy

The pre-diagnostic stage is accompanied with formulation of problem statement and the main research question with the help of research methods compatible with research issue. The intervention stage consists of multiple cycles each of which involves five steps of JLS process. They are the following:

Step 1. Setting long-term goals and objectives, developing ethical principles, research question, research theme and research proposal.

Step 2. Planning LS1 which includes rigorous study of research materials, discussion about how to instruct teaching, observe and anticipate students' thinking according to selected tasks.

Step 3. Conducting LS1 and observing teacher instruction, students' content and thought process through notes, observation sheets and video recordings.

Step 4. Post-lesson study discussion involving data analysis about teacher's instructions, comparative analysis of students' predicted and current responses to task performance, reflection, evaluation and comments from LS experts and outside observers.

Step 5. Reflection on LS cycle 1 and LS documentation records according to the research proposal parameters.

Multi cyclical feature of LS model is significant to construct objective and argumentative knowledge claims. After each cycle subject test is needed to be taken to diagnose students' current academic knowledge addressed the research question which is the essential component of AR procedure. The post-diagnostic stage involves the same research methods tested at pre-diagnostic stage in order to establish whether the research questions are resolved or not, compare and triangulate data analysis and identify objective research findings and results. In LS process, it is of much importance to compare data analysis of pre and post-diagnostic research findings through such research methods as observation, questionnaire, interview and testing subject content in alignment with specific research instruments such as observation sheets, note taking, reflective journal, interview lists, and survey questionnaire. The knowledge construction stage is closely associated with LS product which is needed to be justified and validated through qualitative or quantitative or mixed method research design. Consequently, 4 LS as AR stages are significant to generate theory from practice.

As project realization of LS model, evaluation checking list describes 37 LS components clearly according to LS as AR stages and steps. It guides teacher-practitioners to undergo the whole LS process as self-assessors, correctors and action researchers (Table 4).

Table 4

Evaluation checking list of Lesson Study model in integration with Action Research methodology (adapted from Isoda M. et al. [29], Lewis C. et al. [7], Isoda M. [9], Lewis C. et al. [35], Fujii T. [10], Takahashi A., McDougal T. [14], Pjanić K. [15])

№	Components	LS as AR stages and steps				
		1	2	3	4	5
I		Stage I. Pre-diagnostic stage: Developing LS documentation				
1	Preliminary actions	Build a team, select a group or a class as research participants for LS research process, develop research background and research issue.				
2	Pre-diagnostic research	Conduct pre-diagnostic research related to the issue. Identify students' actual learning problem through data analysis of such research methods as observation, questionnaire, subject test and interview.				
3	Formulation of research question	Compare students' actual learning problem with expected ideal one that will be formulated in long term goals, define gaps and concrete problem statement and formulate the main research question or hypothesis and concrete long term goals.				
4	Ethical principles	Obtain permission from students and principle for conducting LS process. Prepare such documents as student consent form and principle consent form. Develop ethical principles of anonymity, honesty, and confidentiality, etc.				
5	LS schedule, research plan	Establish length of LS project, schedule and research plan				
6	LS proposal	Develop and redevelop preliminary LS proposal including (description of research theme, long term goals connected with the unit within curriculum and standards, students' current learning trajectories, design of LS plan, a problem solving task design, ways of improving the lesson plan in accordance with learners' current needs, anticipation of student thinking, design of data collection during the lesson (observation, interview sheets), identification of rationale for chosen pedagogical approach).				

Continuation of Table 4

7	LS instructional plan	Develop instructional plan for selected unit to address the research theme (long term goals, subject unit, anticipating student thinking, structure of lesson plan, data collection plan, learning trajectory model, rationale for selected approach, systematic recording of group members' action research, critical and reflective thinking. Systematically record the whole research process in the instructional plan till the end of LS process.					
8	Literature review	Literature review on interrelations of LS and AR approaches till the end of LS research process.					
II		Stage 2. Intervention stage					
		Step 1. Concrete goal setting					
9	Setting goals and research theme	Set long-term goals, objectives and research theme (<i>students' current learning problem + research question=long term goals=a research theme</i>). Reformulate your research theme to make it more concrete.					
		Step 2. Planning LS: Pre-lesson study stage					
10	"Kyozaikenkyu" a rigorous research of instructional teaching materials	Select unit according to subject curriculum, deeply study the curriculum, subject content, review numerous literature sources (textbooks, research articles, teaching aids, manipulative, handbooks, methodical brochures, tasks, questioning strategies), select tasks, teaching methods, techniques and strategies and design lesson plan draft addressed lesson goals and research theme.					
11	Data collection plan	Select classroom data sources (observation, testing, reflective journals, students' work and responses, photos, video recordings, field notes) suited to the research question and develop data collection plan.					
12	Task design for lesson study	Design tasks in correspondence with the lesson goal. Tasks focused on structured problem solving instructional approach includes problem presentation with a key question to present the task, teacher's task, desk and board instructions, student observation, student and teacher interactive dialogue and the whole class discussion in the context of comparison, contrast and summing up.					
13	Selection of students for observation	Team observers select case students of high, middle and low level, study their learner characteristics and predict their responses to the tasks in a written form in their observation sheets. Student observations can also be individual, pair, group and the whole class. So, team members choose the type of observation beforehand.					
14	Prediction of students' responses	Teachers put themselves in the place of students and do the task included in the lesson plan as students. They predict the whole class's possible answers to the task in general, and then anticipate high, middle and low level students' solutions. They also envisage student thought in the context of how students' prior knowledge contributes to acquisition of new knowledge.					
15	"Koushi" support	Lesson study professionals give advice to address teaching and learning issues faced by team members during the lesson plan design.					
		Step 3. Conducting LS focused on SPSA					
16	Lesson study	Teacher conducts the research lesson previously planned jointly by team members taking the roles of an instructor, guider, monitor and observer.					
17	1. "Hatsumon" Problem presentation with key questions	Teacher presents a problem (task) by putting mostly key questions related to the new lesson topic. Questions, provoking students' interest should support to comprehend the task, raise students' interest and motivation to learn. Task (problem) presented by the teacher is needed to be performed by students in connection with the prior knowledge. During the lesson the number of "hatsumon" questions is not limited. Teaching strategies and techniques, students' right and wrong solutions are anticipated beforehand so as to compare and contrast them with students' actual solutions.					
18	2. "Kikan-shido" Instructions at desk, teacher's observation of students' individual, pair or group work	Time is given to students to do the task or solve the task individually, in pair or in groups. Teacher silently goes around the classroom scanning, observing and evaluating students' problem solving activities or task performance. Individual, pair, group and the whole class observations occur. Teacher finds mentally those students who have done the task properly. They will be called to present their solutions before class. Teacher also pays attention to those students with wrong direction and gives advice where necessary. Therefore teacher uses teaching formative evaluation. Students' right and wrong solutions, answers, teacher's helping tips and hints should be predicted by the teacher beforehand.					

19	3. "Neriage" The whole class discussion	Teacher calls students to the board to share with their answers and present the task execution orally. Different solutions are described, compared, discussed in class to generalize ideas and find the final proper solutions and visually presented on the board. Errors can be also discussed in case it is helpful for students to compare and define the correct task performance.						
20	"Bansho" Chalkboard instruction	Bansho as an important teaching instructional technique. It provides students with a great opportunity to memorize and compare all the task performance. Therefore, all the chalkboard recordings of the whole lesson are not erased to support students' discussion in comparison and contrast. The name of the students who present the solutions are labeled and fixed on the board as "student's ownership".						
21	4. "Matome"	Teacher summarizes briefly what students have learned throughout the lesson. Summing up should be matched with the lesson objectives.						
22	Student observation /data collection	Team teachers as observers silently observe their own case students' actions, interactions, behaviors, and responses to the tasks, solution strategies and ideas in a written form in their observation sheets. Selected case students' predicted responses are recorded in the sheet beforehand during LS planning stage. They also note students' strengths and weaknesses, cognitive and thought process, learning issues revealed during the lesson.						
23	Instructor observation/data collection	Team teachers also observe instructor's teaching instructions, interactions with students related to the structured problem solving approach. They observe teacher's task, desk and board instructions during his or her communication with students.						
24	Outside observers and experts	Outside observers and experts also collect data sources on student observation.						
Step 4. Post-lesson study discussion								
25	Introduction	First, teacher instructor briefly introduces the purpose, stages and teaching resources, methods and techniques used during the lesson as well as learners' understanding, responses, actions and reactions at each lesson stage.						
26	Observers' comments	Second, observers discuss both learners' actual thinking in comparison with predicted one and instructors' teaching instruction techniques and interaction with the class as a monitor, observer, scanner and guider. They identify students' strengths and weaknesses, raise teaching and learning issues, reflect, review, evaluate the lesson and give recommendations to refine the next lesson.						
27	Discussion	Third, teachers discuss and compare the original goal designed before and actual goal occurred in the class as well as find students' new learning and teacher's new teaching issues with the aim of improving the lesson for the next cycle.						
28	Experts' final comments	Outside observers give final comments and recommendations to the lesson in the context of how to improve students' broad educational values; cognitive, creative, listening, presentation and independent learning skills.						
Step 5. Reflection								
29	Reflection on data analysis, evaluation	Team members reanalyze, reflect and evaluate the conducted research lesson. They identify what they learned from each step of LS cycle, what research findings they found and changes they made to put into practice, to what extent implemented innovative teaching approach or method was effective, what ideas or argumentative knowledge they generated, whether subsequent research questions were revealed to address at the next cycle.						
30	LS documentation	Both team teachers and school observers keep record of LS documentation: LS proposal, reflection on student observation, LS plan design, analysis, evaluation and reflection on the whole cycle etc.						
Conducting a series of LS cycles								
31	Iteration of LS cycles	Cycles are needed to be iterated in order to explore the learning and teaching problems properly. New knowledge is generated as a result of systematic research.						
III Stage 3. Post-diagnostic LS stage								
32	Post-diagnostic research	Collect post-diagnostic data through research methods taken at pre-diagnostic stage to identify LS findings.						
33	Data analysis	Analyze data collection: translate, transcribe, code and categorize data and identify research findings related to research questions.						
34	Comparison	Compare analysis of pre and post-diagnostic research, identify results, make overall evaluation and reflect on the whole cycle.						

Continuation of Table 4

35	Triangulation	Triangulate research findings and establish to what extent the research findings of research methods are triangulated with one another.					
IV		Stage 4. Knowledge construction: Generating new knowledge or theoretical arguments					
36	Knowledge construction	Generate new knowledge or theory from qualitative and quantitative data analysis, descriptive and explanatory arguments. Justify and validate research findings.					
37		Disseminate LS results through publications, reports, presentations etc.					

On the basis of AR philosophy, proposed by McNiff J., LS philosophy was conceptualized in view of four theories [27]:

-ontology; an existence theory of actual LS process in which teacher-practitioners take the roles of monitors, observers, scanners, assessors, instructors [9], guiders, facilitators, reporters, self-assessors, assessors and action researchers and “the knowledgeable others” see themselves as professionals, advisers and guiders;

-epistemology; a theory of knowledge created from multi cyclical LS process and life-long learning, validated and justified as a result of data analysis of selected research methods and tools addressed hypothesis or research questions;

-methodology; construction of theory or knowledge claims focused on systematic structured LS procedure of steps within iterative cycles. LS framework includes research design, ethical principles, site and participants, formulating research questions, long-term goals, research theme, developing LS proposal, instructional plan, anticipating and observing student thinking, teacher instructions, planning, conducting, observing and discussing live research lessons, data collection and analysis of selected research methods, evaluation, reflection, conducting a series of LS cycles, generating knowledge from results, its justification and validation, documentation and dissemination of research findings;

-methodology; conceptualization of LS principles that is 1) problem solving, 2) multi cyclical research, 3) action research and progress oriented collaboration, 4) cooperation, 5) live lesson study observation based on students’ actions and thought and teacher’s instructions, 6) instructional teaching, 7) joint dialogic critical and constructive reflection, 8) cultural principles focused on country’s beliefs, emotions, behavior, values, 9) contextualization and transformation, 10) building theory from continuous research practice, 11) integration of LS with AR, 12) sustainability.

-socio-cultural theory; joint responsibility of LS members and knowledgeable others for effective LS in the context of AR, productive communication, close interaction and collaboration with one another to build PLC and CPD. Another socio-cultural aspect is modification of LS culture emerged as a result of different countries’ adapted LS models designed according to various personal, social, cultural beliefs, norms and situations [4].

Research findings to address the second research question are that integration of AR in JLS through LS model and evaluation checklist is effective to theorize LS because first, AR, being a general term for many research processes and qualitative type of research methodology [36] with pre-diagnostic, intervention and post-diagnostic stages, can be effectively put in LS practice to create theory. Second, inclusion of three or more research methods in the LS model is necessary to triangulate findings which are essential components of AR procedure. For example, interview, observation, questionnaire survey, note taking and reflecting journals can also be applied in LS case studies to identify research findings and measure them in the context of triangulation design. Third, 4 AR stages presented in LS model serve as a foundation for accurate categorization of multiple JLS components in order and sort out them into 5 JLS steps to undergo the whole multi-cyclic LS process. The model and evaluation checklist are key indicators to generate productive theoretical arguments and build LS success and sustainability.

LS becomes theorized and scientifically grounded through integration of AR methodology in JLS approach. Such LS model construction focused on AR methodology is supported with Elliot’s conceptualization about LS as “*a form of practice-based educational action research*”. He elaborated high-quality criteria for evaluating LS quality through AR methodology. They are problem concern focused on teaching practice and concrete situations, formulating research questions and testing them against data collection and analysis of research methods in triangulation design, construction of theory or knowledge in collaboration through democratic reflexive practical process with such criteria demands as *integrity* in search for appropriate teaching strategies (means), aims (ends) and values, *open-mindedness*, *objectivity* and *honesty*. Contrary, Kwiat-

kowski B. in his study about symbiotic roles of AR, LS and learning study contends that all the three approaches differ from one another despite their commonalities [19].

As it is impossible to embrace all the LS components in the LS model within the whole cycle of LS procedure, evaluation checklist is considered to be an additional supporting research instrument for teacher practitioners to put the LS model in practice. This finding is justified by McNiff J. who argues the importance of checklist questions to apply at each AR stage to organize, regulate, correct, reflect and evaluate the whole research process [27].

Since the main goal of LS, as Fujii T. highlights, is to generate new knowledge for teaching and learning not to improve lesson plan [10, 28], 4 AR stages and description of multi-cyclic LS structure, given in the checklist, is powerful for practitioners to acquire explicit theoretical knowledge and test it in practice. Data analysis, results and reflection of one LS cycle cannot resolve the problem, so it requires continuation of the process over a long period of time to generate product from process. LS process carried out for a long time contributes to building a sustainable PLC and CPD of educators as well as transforming innovative curriculum and educational instruction. Multi cyclical feature of the LS model is also correlated with another plan-do-check-act (PCDA) JLS model operated at individual, group and school levels and characterized with employment of iterative cycles even after hypothesis confirmation in order to create explicit knowledge [11].

Conclusions

To sum up, for non-Japanese teacher researchers theoretical knowledge and practical process of LS approach is acquired through rigorous study of 37 components of complex JLS structure, practical realization of multi cyclical LS model in integration with JLS approach and AR methodology and implementation of evaluation checklist elaborated according to the stages and steps of the LS model. In other words, in this article, LS is theorized through in-depth study of JLS structure, LS modeling, evaluation checklist and conceptualization of LS methodology. This theoretical argument addresses unresolved issues associated with LS theory and practice; LS research design, LS structural components, for example, teacher teaching and student learning instructions, anticipating student thinking, teacher's task, board and desk instructional practice focused on problem solving, contextual and situational task design, dialogic and discussion-oriented interaction between teacher and students. As a result of theoretical research of JLS framework in integration with AR approach, 3 research products: LS model, evaluation checklist of the LS model and LS philosophy were developed. These findings can contribute to theorizing LS, developing LS methodology as well as a set of LS criteria requirements in future. The multi cyclical model can function as a significant roadmap and checklist as an evaluation tool for teacher-practitioners to comprehend LS phenomenon, put in practice the overall LS steps. Theorizing LS through the lenses of AR design contributes to generating theoretical knowledge from results of pre and post diagnostic comparative data analysis which is needed to be evaluated according to a set of criteria and objectively justified to become reliable and valid. LS, modeled as LS as AR, is significant in the context of integrated approach to improve teacher and learner education, generate and justify scientifically grounded knowledge as well as transform teachers' social, cultural and educational democracy. AR methodology will contribute to conceptualizing evidence based LS methodology as unique one of a kind research methodology in future.

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***Lesson Study* үдерісінің теориялық негіздері: *Action Research* зерттеу әдіснамасын жапондық *Lesson Study* тәсіліне интеграциялау**

Шетел мұғалім-зерттеушілерінің алдында тұрған жаһандық мәселелер сабақты зерттеу, яғни *Lesson Study* (LS) үдерісінің теориялық және практикалық негіздері, зерттеу әдіснамасы және көптеген елдердің ерекшеліктеріне сәйкес контекстендірілген LS зерттеу жобаларының ұтымдылығы мен тұрақтылығына қатысты. Бұл мәселелер әлемге әйгілі жапондық LS үдерісінің түпнұсқасын (JLS) терең теориялық зерттеу қажеттілігін көрсетеді. Мақаланың мақсаты — JLS үдерісінің көп қырлы құрылымы мен құрамдас бөліктерін теориялық талдау, іс-әрекеттегі зерттеу, яғни *Action Research* (AR) әдіснамасын JLS үдерісіне интеграциялау арқылы LS үдерісін нақты түсіну, ғылыми негіздеуге бағыт-бағдар ретінде теориялық зерделеу. Негізгі идея — AR әдіснамасын JLS үдерісіне интеграциялау арқылы LS теориялық негізін моделдеу, LS философиясын тұжырымдау. Салыстырмалы талдау, талдау және синтез, құрылымдық талдау және модельдеу әдістері негізіндегі талдау нәтижесінде AR әдіснамасымен біріктірілген көп циклді LS моделі, модельді жүзеге асыру үшін бағалау құралы ретінде пайдаланылатын бағалауды бақылау парағы әзірленді және LS философиясы тұжырымдалды. Модель мен бақылау парағы 37 құрамдас бөліктермен бірге AR контекстінде LS үдерісінің 4 сатысы (алдын ала диагностика, араласу, қорытынды диагностика және теорияны қалыптастыру) арқылы өту үшін пайдаланылады. Модель теориялық, практикалық білімдерді меңгеруді жақсарту үшін маңызды болса, бағалау парағы өзін-өзі түзету, өзін-өзі бағалау және өзін-өзі реттеу құралы ретінде маңызды. Болашақта зерттеу нәтижелері LS үдерісін объективті, дәлелді ғылыми негіздеу мақсатында AR үдерісімен өзара байланысқан кешенді әдіснамасын, бағалау критерийлерінің жиынтығын жасауға ықпал етеді.

Кілт сөздер: жапондық сабақты зерттеу үдерісі, іс-әрекеттегі зерттеу, сабақты зерттеу контекстіндегі іс-әрекеттегі зерттеу, *Lesson Study* философиясы, *Action Research* әдіснамасы, *Lesson Study* компоненттері, *Lesson Study* моделі.

Н.С. Ибадуллаева

Теоретизирование подхода *Lesson Study*: интеграция методологии *Action Research* в японский подход *Lesson Study*

Глобальные проблемы, с которыми сталкиваются учителя-исследователи за пределами Японии, связаны с теоретическими и практическими знаниями, методологией исследования, успехом и устойчивостью проектов адаптированных исследований уроков *Lesson Study* (LS). Эти проблемы подчеркивают необходимость углубленного теоретического исследования оригинального и успешного японского подхода LS (JLS). Цель статьи — изучить теоретизацию LS посредством теоретического анализа многогранной структуры и компонентов JLS и интеграции методологии исследования действий (AR) в JLS с целью научного обоснования и конкретного понимания подхода LS. Основная идея — теоретизация LS посредством моделирования на основе интеграции AR в JLS и концептуализация философии LS. В результате методов сравнительного анализа, анализа и синтеза, структурного анализа и моделирования были разработаны многоцикловая модель LS, интегрированная с методологией AR; контрольный список оценки, используемый в качестве инструмента оценки для реализации модели; и философия LS. Модель и контрольный список используются для прохождения через 4 этапа LS в контексте AR (предварительная диагностика, вмешательство, итоговая диагностика и генерирование теории) наряду с 37 компонентами. Модель важна для получения теоретических и практических знаний, контрольный список оценки имеет решающее значение на практике как инструмент самокоррекции, самооценки и саморегулирования. В будущем результаты исследования будут способствовать разработке комплексной методологии LS с набором критериев оценки с целью представления LS в качестве объективного, научно обоснованного исследовательского подхода в интеграции с AR.

Ключевые слова: японский подход исследования урока, исследование в действии, исследование урока в контексте исследования в действии, философия *Lesson Study*, методология *Action Research*, компоненты *Lesson Study*, модель *Lesson Study*.

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