Working Paper:

Developing subject expertise through practice

An example from Japanese teacher preparation and development

The Community of Practice for improving initial teacher education

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Learning First conducted the analysis presented in this report. The interpretations of how these systems operate are the authors’, and do not necessarily represent the views or official positions of governments or officials in the systems analyzed.

Learning First produced this working paper as part of the global Initial Teacher Education (ITE) Community of Practice (CoP).

This paper was written to help teams in the CoP think about how to develop deep subject expertise in novice teachers through practice. This paper is a working draft and should not be cited.

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1 What can we learn from Japanese teacher preparation and professional development?

This briefing paper explores how Japanese initial teacher education (ITE) and ongoing professional development employ the principles of effective adult learning and what lessons we can learn for systems and organizations contemplating reform in their ITE.

Japan is a large education system with more than 13 million students and 900,000 teachers. After improving significantly between 2009 and 2015 Japan is ranked sixth among OECD countries in reading and first in mathematics and science on PISA.

Japan utilizes a common approach to teacher preparation and development that places a strong emphasis on subject-specific teaching expertise. The approach focuses on how teachers learn from analyzing their own instruction and students’ learning through a process called lesson study.

Each part of the teacher development pathway in Japan (detailed in Section 3) is focused on developing strong subject expertise in teachers as follows:

- Short but high quality practicums that teach teachers how to evaluate their practice and introduce them to the main approach to school-based professional learning (lesson study);
- Induction programs that transition new teachers into the role by using frequent observation, feedback, mentoring and peer accountability through lesson study;
- Rigorous quality assessment at the hiring stage, ensuring teachers have strong subject expertise while also providing a feedback loop to ITE providers on the quality of their graduates.

Other systems can take important lessons from Japan on how to develop teachers’ subject-specific teaching expertise at each stage of the teacher development pathway (see Section 4).

A focus on subject-specific teaching expertise – henceforth referred to as subject expertise – is vital for improving teacher preparation and development. Lesson study, which is at the core of the Japanese approach to teacher development, focuses on subject expertise in a way that incorporates everything a teacher needs to know and do to improve student learning in the classroom.

In Japan, educators and teachers identify three levels of subject expertise for teaching. These levels inform how teachers develop across the pathway (using mathematics as an example).

- **Level 1**: The teacher can *tell students the important basic ideas of mathematics* such as facts, concepts, and procedures. Another way of looking at this is that Level 1 teaching is the same as what a parent could do. Japanese educators do not think that this is enough to be considered an effective teacher.
- **Level 2**: The teacher can *explain the meanings and reasons of the important basic ideas of mathematics* for students to understand them. Level 2 teaching incorporates the specialist knowledge teachers need to explain a concept (sometimes referred to as specialized subject matter or conceptual content knowledge) and how to teach it (pedagogical content knowledge) (see Box 1).

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2 OECD, 2016
3 Sugiyama, 2008; Takahashi, 2011. Note: These groupings were originally created to distinguish levels of mathematics teaching but they can apply to all subject areas.
Level 3: The teacher can provide students with opportunities to understand these basic ideas and support their learning so that the students become independent learners. A Level 3 teacher has such deep subject expertise that they can design and facilitate selected classroom tasks that allow the students to discover the answers for themselves. This form of teaching helps students extend their thinking beyond just the content that is taught and develop problem solving skills.

The levels are helpful to distinguish between different types of teaching and the level of development required to excel in each of them. They are not to be misunderstood as quantifiable standards. They do not have an effect size or come with an affiliated list of competencies. A teacher is not a level 1, 2 or 3 teacher. Rather the levels refer to the subject expertise required for different types of teaching.

Lesson study (explained in detail in Section 2) helps build Level 2 and 3 subject expertise. It involves subject-specific groups of teachers analyzing student reactions and thought patterns and designing effective lessons to best teach the content. This collaborative and subject-specific approach helps develop deep expertise in beginning teachers.

This paper explores how Japan prepares high-quality new teachers with a focus on lesson study as an approach to teacher development and how subject expertise is reinforced during each stage of the teacher development pathway.
Box 1: The importance of subject expertise and the difference between content knowledge and pedagogical content knowledge

Teacher subject expertise is a key component of teaching quality. There is strong evidence that teacher subject expertise has a great impact on student outcomes. The most effective teachers have a deep knowledge of not just the subject itself (content knowledge) but also how to teach the subject (pedagogical content knowledge). Content knowledge and pedagogical content knowledge can mean different things in different countries so we have defined them below (see Figure 1).

Content knowledge refers to what teachers need to know about the subject. For example, a teacher knows that words have different origins, such as Greek or Latin, and that word roots have meaning (e.g., mal is a common Latin root that means “bad”). Content knowledge is comprised of both common content knowledge (what an average person would know) and specialized content knowledge (content knowledge not typically needed for purposes other than teaching, usually knowledge of why something is the case).

Pedagogical content knowledge, on the other hand, refers to what teachers need to know about how to teach the subject. For example, a teacher knows that students from Spanish-speaking backgrounds will already know words with Latin roots and makes a plan to help students identify and make connections between English and Spanish words that have the same roots (e.g., the Spanish word mal and the English word malicious).

Figure 1: Two types of subject expertise

Pedagogical content knowledge requires the interaction of content with knowledge of students and knowledge of teaching.

For example, a key piece of pedagogical content knowledge is being able to anticipate incomplete student understandings. Being able to understand why a student might make a particular type of mistake, and how to correct it, is necessary to advance student learning.4

In order to help a student with an incomplete understanding of multiplication, a teacher must:

- Have the content knowledge to understand multiple correct ways of solving a math problem and
- Know what prior knowledge students may be bringing from earlier math classes to anticipate their thoughts.

Though content knowledge and pedagogical content knowledge can be measured separately,5 in practice, of course, they are woven together since pedagogical content knowledge draws on a base of content knowledge, plus an understanding of pedagogy and student learning.

Adapted from Ball, Thames, & Phelps, 2008; Jensen, Roberts-Hull, Magee, & Ginnivan, 2016; Shulman, 1986
2 Lesson study: The Japanese approach to teacher development

“For Japanese educators, Lesson Study is like air, felt everywhere because it is implemented in everyday school activities, and so natural that it can be difficult to identify the critical and important features of it.” - Professor Toshiakira Fujii, Tokyo Gakugei University

In Japan, there are two different types of professional learning. The first is traditional learning through reading books or watching lectures or demonstration lessons. This can be used to develop the knowledge for teaching a subject and is included in ITE courses in Japan. The second style of professional development is lesson study. Lesson study is used to help teachers develop the expertise for teaching a subject and is deeply rooted in practice.

Lesson study is fundamental to how Japanese schools and universities improve classroom teaching. Lesson study establishes a process that challenges teachers to test and refine their instructional practice. It helps strengthen teachers’ subject expertise and drives the creation of professional learning communities in schools. It first gained attention internationally in 1999 with the publication of The Teaching Gap, but it has a history in Japan that is over 100 years old.7

Lesson study consists of groups of teachers deeply analyzing lessons using an improvement cycle (a process of assessing the impact of teacher practice). This is a similar process to other forms of collaborative professional development aligned with adult learning principles utilized in high-performing systems, such as British Columbia’s cycles of inquiry or the school improvement models of Ontario and Singapore.8

In Japan, lesson study occurs throughout a teacher’s career, from in-school practicums during ITE, to teacher induction, to ongoing professional learning. Teachers learn the required steps to develop their teaching during ITE, which is continued throughout their career.

Lesson study is nearly universal in Japanese schools, although its implementation varies.9 In groups, teachers prepare a research lesson to meet goals for improving instruction. One or more teachers lead the lesson while others watch and collect evidence on student engagement and learning.10 After this, a debrief discussion is held on what happened, how students approached the assigned task and how the lesson can be improved in the future. The purpose of the lesson study is not to refine a lesson to perfection but instead to deeply analyze a lesson in order to build teacher expertise.11

A typical lesson study cycle takes at least 5 weeks. It is a slow and considered developmental process.12

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4 In science, teachers with these skills had greater student achievement gains. Sadler, Sonnert, Coyle, Cook-Smith, & Miller, 2013
5 Jüttner, Boone, Park, & Neuhaus, 2013
6 Fujii, 2015
7 Arani, Keisuke, & Lassegard, 2010; Fujii, 2015; Stigler & Hiebert, 1999
8 Halbert, Kaser, & Koehn, 2011; Ng, 2003; Ontario Ministry of Education, 2011
9 Lewis, 2016
10 Sims & Walsh, 2009
11 Takahashi & McDougal, 2016
12 Takahashi & McDougal, 2016
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The key stages of Japanese lesson study are as follows (see Figure 2):

1. **Goal setting:** Teachers consider long-term goals for student learning and development. They study the curriculum and standards and identify a topic of interest.

2. **Lesson planning:** Teachers select or revise a research lesson and write a detailed lesson plan that includes: long-term goals, anticipated student thinking, data collection, a learning arc for the lesson, and a rationale for the chosen approach. Teachers anticipate potential problems in student understanding, questions students may ask, and how the teacher should respond. As part of this step, teachers much participate in *kyouzai kenkyuu*, the careful study of academic content and teaching materials.13

3. **Research lesson:** Also called a demonstration lesson, one team member teaches the lesson while other teachers observe and collect data on student responses. Teachers from neighboring schools can also be invited to attend the lesson.

4. **Post-lesson discussion:** In a formal post-lesson discussion, teachers share data from the lesson to illuminate student learning and identify issues related to the content, lesson, unit design, and instruction.

5. **Reflection:** The lesson is revised and sometimes a second round of lessons is held to address issues and improve instruction. Teachers document the cycle to consolidate and carry forward their learning, as well as formulate new questions for the next cycle of lesson study.14

\[\text{Figure 2: The Lesson Study Cycle}\]

2.1 **Lesson study is a school-wide teacher development process**

Seen as a whole school process, lesson study is how schools develop teachers and gradually improve instruction. It is not about making a single lesson perfect. Instead, it is a process whereby teachers

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13 Note: Takahashi & McDougal, 2016 separate this step into two: 1. *Kyouzai kenkyuu* – ground work for lesson design and 2. Develop lesson research proposal with unit plan.

14 Fuji, 2013, 2015; Lewis & Hurd, 2011; Lewis, 2016
develop collaboratively and closely analyze how to maximize the impact of different teaching practices on student learning.

Individual research lessons are part of a yearly, school-wide lesson study process that leads to the publication of an action research report. Many researchers misunderstand lesson study by focusing only on the mechanics of an individual research lesson, while underemphasizing the broader school process of lesson study.\textsuperscript{15}

In many schools, a broad lesson study research theme is chosen at the start or end of each year. The school then creates a schedule for lesson planning, with multiple research lessons to take place throughout the year.\textsuperscript{16} Smaller groups of teachers choose a more specific topic for study within the school-wide theme, based on an analysis of student learning needs.\textsuperscript{17} In many schools, these groups of 4-6 teachers specialize in the same content area or teach similar grades. Together they will plan and carry out around 2-3 lesson study cycles per year (see Figure 3).\textsuperscript{18}

Figure 3: Illustration of multiple lesson study cycles in a school year

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{lesson_study_cycle.png}
\caption{Illustration of multiple lesson study cycles in a school year.}
\end{figure}

\textsuperscript{15} Chichibu & Kihara, 2013
\textsuperscript{16} Chichibu & Kihara, 2013
\textsuperscript{17} Jensen, Roberts-Hull, Magee, & Ginnivan, 2016
\textsuperscript{18} Yoshida, n.d.
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Teachers can spend months working together to plan a lesson in order to test a new approach to their group’s chosen topic. Planning for a single research lesson can involve 10-15 hours of meetings. Lesson plans are sometimes presented to the whole-school staff for feedback. At the end of the year, teachers will often write an action research report that pulls together all of their learning, including a detailed lesson plan, summaries of their professional learning and questions to consider for future research lessons.

This school-wide improvement cycle involves frequent peer observation, mentor observation, research, feedback and collaboration. In this way, lesson study gives a structure to teacher professional learning communities in schools and ensures they are focused on student learning and improving instructional practice. For an example of a school’s lesson study process, see Box 2.

Mentoring, feedback and advice from more senior teachers within or outside of the school is an essential part of the process. These ‘knowledgeable others’ contribute important insights during the planning stages as well as the post-lesson discussion.

In Japan, the content of the curriculum is controlled by the Ministry and textbooks are carefully screened to ensure that they have been written in line with the Ministry’s guidelines. As a result, through lesson study, teachers are able to investigate and utilize carefully designed curriculum materials to avoid “reinventing the wheel” and actually add to the knowledge base.

Lesson study is also conducted across schools by subject research organizations, voluntary teacher groups and in laboratory schools attached to major universities. National universities of education will often have affiliated schools that have lesson study sessions open to the public. Student teachers are able to observe these public lesson study sessions.

Box 2: Example of how lesson study works in schools

Yoshida presents an example of lesson study in a Japanese elementary school. Teachers in the school have collaboratively analyzed the needs of their students and have identified a goal for their lesson study. They have noticed their students are increasingly afraid of making mistakes in front of their peers, which has affected participation in mathematics. The group chose as a goal to promote “students’ ability to think autonomously, invent and learn from each other” during mathematics classes. This goal will be explored over three years, with a different sub-goal each year.

After weeks of research, meetings and detailed lesson planning, a specific task is given to students for problem solving: “Akira collected 12 Ginko leaves. Then he drew faces of his family on 7 of the leaves. How many leaves are left over?” Students are given manipulatives and asked to find a solution to the problem during the lesson.

The teachers involved in the research lesson anticipated solutions that students might offer. They expected students to either subtract through counting or break the problem down into grouping to make subtraction easier:

**Counting-Subtraction Method:**

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19. Jensen et al., 2016; Linda Darling-Hammond, Ruth Chung Wei, Alethea Andree, Nikole Richardson, & Stelios Orphanos, 2009
20. Stigler & Hiebert, 1999
21. Sims & Walsh, 2009
22. Arani et al., 2010; Chichibu & Kihara, 2013
23. Tucker, 2015
• Taking away 7 from 12 by counting

**Subtraction-Addition Method:**
- 12 consists of 10 and 2
- 10-7=3 3+2=5

**Subtraction-Subtraction Method:**
- 12 consists of 10 and 2
- 7 consists of 5 and 2
- 12-2=10 10-5=5

Squares of colored drawing paper were chosen as the manipulative and students were asked to present their drawing paper and their work to the class. After the research lesson, teachers debriefed. They found that the use of individual squares made it difficult for teachers to understand the methods students were using to solve the problem, and it also made it difficult for students to discuss their methods and learn from each other.

Teachers analyzed and revised the lesson to better serve the goals of facilitating students to think autonomously and share their learning. For the next research lesson, the manipulative and student hand-outs were improved. Students were given a printed tile in strips of ten and two, with scissors to cut and rearrange. This allowed students to more easily capture their work and communicate the methods they used, which also helped teachers to analyze student approaches to the problem.

At the end of the year, teachers will produce a report of their work that will inform the next year’s lesson study. This iterative, collaborative process places student learning at the center of instructional improvement. The focus is not just on how the lesson was taught but on how students approached the task and responded to the lesson.

*Source: Yoshida, n.d.*

### 2.2 Lesson study focuses on student learning and builds subject expertise in new teachers

The key feature of lesson study is its focus on the impact that the teacher is having on student learning. While planning for research lessons, teachers discuss how students might understand the topic and anticipate their approach to the task. This relentless focus on the students and their individual approaches to understanding the task is one of the key strengths of lesson study's design. By explicitly analyzing and discussing student learning issues, teachers increase their own pedagogical content knowledge at the same time as refining lessons for their students.²⁶

Lesson study is designed to gradually build subject expertise across the entire teaching staff.²⁷ As shown in Figure 4, lesson study can increase teacher subject knowledge through a deeper understanding of student learning and of the impact of different instructional approaches. This can establish a cycle that slowly builds subject knowledge in teachers, leading to improved teaching and improved student outcomes.

For example, when looking at different ways of introducing students to algebra, teachers analyze different approaches they might take, predict the different ways students can understand (and misunderstand) the key contents, and decide how best to address these issues. All of this takes teachers

²⁶ Jensen et al., 2016
²⁷ Stigler & Hiebert, 1999
into deep pedagogical content knowledge, as they must understand the underlying mathematical concepts and the different ways these concepts are learnt by students.

Figure 4: How lesson study develops teacher subject expertise in Japan

Lesson Study Activities
1. **Goal setting**: Study curriculum and teaching materials, set long-term student goals
2. **Lesson planning**: Plan research lesson and anticipate student thinking
3. **Research lesson**: Conduct lesson and collect data
4. **Post-lesson discussion**: Discuss data and implications for teaching and learning
5. **Reflection**: Revise and reteach, capture learning

Outcomes
- Improved teaching
- Improved student learning

**Teacher subject knowledge**
- Deeper understanding of student learning
- Greater understanding of the impact of different approaches

Feedback to future lesson study

Source: Jensen et al., 2016

This process is particularly important for new teachers, who might graduate from ITE with strong content knowledge but with less understanding of how to apply that knowledge in the classroom. Lesson study allows new teachers to simultaneously develop and apply their instructional knowledge and skills. The collaborative nature of lesson study means new teachers learn directly from more experienced peers. Consequently, lesson study is a key feature of the intensive teacher induction process in Japan.

Lesson study is a powerful technique as it frames the unit of learning around a lesson. Teachers need to design and deliver lessons that improve student learning every day as part of their job. An effective lesson considers all the complexities of teaching and produces an outcome of student learning. It requires both theoretical knowledge and practical expertise.

Lesson study guides teachers (and candidates) through this complex process. Teachers must design a lesson, which requires them to have the curriculum knowledge and analysis skills to prioritize learning goals as well as the content knowledge and pedagogical content knowledge to design the lesson tasks. To deliver the lesson, the teacher must be able to give clear instructions, set expectations, manage the classroom, and dynamically modify tasks to respond to student needs. Finally, as part of lesson study, teachers must be able to reflect on their lesson, collaborate with colleagues and update their lessons to improve student learning. Unhelpful debates about what theory and practice is relevant in teacher preparation and development fade away when the lesson is at the core of the learning.
3 What the lesson study approach to teacher development means for ITE in Japan

In Japan, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has the primary responsibility for all levels of education policy, including ITE. The country is separated into prefectures and municipalities, each with their own board of education (similar to states and districts in the U.S.). The prefectural boards employ teachers and fund the municipalities. The municipal boards run teacher induction and in-service training and oversee day-to-day school operations (see Appendix 1 for more details).

The development of teachers with strong subject expertise begins in ITE and runs along every stage of the teacher development pathway (see Figure 5). Short, high-quality practicums introduce student teachers to the principles and practices of lesson study. This is then reinforced through a year-long induction run by the individual municipal boards that incorporates lesson study, mentoring and observation and feedback.

Quality is ensured throughout this process through a rigorous employment exam set by the individual prefectural boards of education that all Japanese teachers must sit. The exam not only ensures quality of ITE graduates, as they must perform well on the exam to be offered a job, but it also creates a useful feedback tool for providers so they can continuously improve their programs. The exam is focused on assessing a candidate’s subject expertise through a written test as well as an interview and demonstration lesson.

Figure 5: The teacher development pathway in Japan

3.1 Initial teacher education includes high-quality but short practicums that set teachers up for ongoing professional learning

A defining feature of initial teacher education programs in Japan is that they establish the foundations for ongoing professional development. They do this by focusing on subject expertise and incorporating short but high-quality practicums.

Initial teacher education programs in Japan have a strong focus on subject expertise (see Appendix 2 for more information on ITE programs in Japan). They aim to develop the knowledge for Level 2 teaching and establish the foundations for Level 3 teaching by incorporating skills in formative assessment, collaborative lesson design and effective classroom observation.

All ITE programs are required to have a specific number of subject expertise credits (see Box 3). Elementary and secondary programs have different credit requirements. For example, to receive a...
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bachelor degree to teach senior high school, a teacher must complete at least 20 subject matter credits. Many ITE programs offer more subject expertise courses than is required, partly to ensure that their graduates can pass the rigorous hiring exam.

Teachers must also take part in lesson study as part of their degree during a school-based practicum. MEXT only requires practicums to be 2 weeks for high school teacher candidates and 4 weeks for elementary and junior high teacher candidates, which is much shorter than in most systems.

Despite being short, these placements are rigorous and well-organized (see Box 4). They use lesson study to introduce prospective teachers to group-based collaborative learning and analyzing teaching and student learning. During their lesson study, student teachers are separated into groups of 5-10 with other teacher candidates, who observe each other’s lesson plans and classes and provide peer feedback. Group discussions are guided by an experienced teacher. These experienced teachers then watch the prospective teachers do demonstration lessons, which are closely linked to the evaluation of the candidate’s practicum.

This is the first time teachers are exposed to lesson study. They are introduced to methods of anticipating student thinking and formulating responses to student confusion.

A procedural and cultural expectation is set for teachers to work collaboratively to discuss and understand student learning through lesson study.

This is a key feature of a teacher’s induction year and their ongoing professional development.

As part of their practicums all trainee teachers are given a mentor teacher who guides them through their lesson study and provides them with ongoing feedback. At the end of their practicum the school has to fill out a feedback and evaluation form about the trainee teacher which goes to the university and makes up part of their final assessment. The feedback is in the form of a checklist and includes information on:

Box 3: ITE course content in Japan (elementary teaching)

1. Courses related to the course of study (at least 8 units)
2. Courses related to teaching (at least 41 units)
   - Basic theory of education
   - Education program and instruction methods
   - Student instruction
   - Educational consultation and career path guidance
   - Lectures in practical education
   - Practice teaching
3. Courses related to subjects or teaching (at least 10 units)
4. Other types of courses (at least 2 units of each)
   - Japanese Constitution
   - Physical education
   - Communication in foreign languages
5. Hands-on caregiving etc.
   - Hands-on training with caregiving for at least 7 days at a social welfare facility etc.

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30 Ministry of Education, Culture, Sports, Science and Technology - Japan, 1953, 2015a
32 Lewis, 2011
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- How the trainee interacted with students
- How they designed their lesson plans
- How they deliver lessons
- How they participated in extra-curricular activities
- How they communicated with colleagues
- How they performed in the classroom

The evaluation checklist is used to determine whether the trainee teacher is demonstrating proficiency or not. Most trainee teachers will receive positive reports unless they performed very poorly.

3.2 Induction provides rigorous in-school training by focusing on observation, feedback, mentoring and peer accountability

Induction in Japan provides a continuous development pathway that extends lesson study practice from ITE into career-long professional learning. It is highly collaborative, with extensive classroom observation and feedback and a focus on developing deep subject knowledge. It involves strong forms of peer accountability to maintain quality and continuous improvement.

Induction is used as an opportunity for graduates to develop practical skills. All teachers in Japan must undergo a year of induction training as set by their prefecture’s board of education. This induction is thorough, integrating lesson study into the daily practice of first-year teachers. Teachers are supervised and provided with ongoing feedback and mentoring to develop their instructional practice and subject expertise (see Box 5).

**Box 4: An example of practicum during ITE from Tokyo Gakugei University**

At Tokyo Gakugei University, student teachers must take part in lesson study during a school-based practicum. A carefully structured research lesson introduces them to the culture and process of the lesson study cycle.

Prior to a second grade math class, a group of student teachers work together to anticipate student thinking for a geometry lesson. One student teacher is charged with instruction, but during the class, the other student teachers and a math subject expert observe and take notes on student behavior.

At the end of the class, they all convene for a discussion of how well they anticipated student responses, which helps them improve their pedagogical content knowledge. They now know more about student thinking in regards to this geometry topic, and they have new ideas about how to best present the material in class. They will write a short reflection on the class as part of their assessment for the practicum.

The process helps teachers practice anticipation of student thinking in the subject, which is a key part of pedagogical content knowledge. The process is also very collaborative. Novice teachers do not have to rely on their own subject expertise to design the lesson, but can call on subject experts for feedback and advice.

Source: Jensen et al., 2016.

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33 Ministry of Education, Culture, Sports, Science and Technology - Japan, 2015b
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Box 5: Facilitating quality induction through lesson study at Nishikigaoka Elementary School

Each year, Nishikigaoka selects a common lesson study theme across the whole school. Every teacher, including new teachers, must pick a lesson study that they want to do under the theme. New teachers attend a planning session with other teachers of the same subject. After the lesson is delivered, there is a review session between all the teachers.

New teachers usually struggle with developing the lesson from the curriculum, predicting how the children might react and identifying signs of the children learning in the classroom. In order to help new teachers with these areas, model lessons are provided by the subject area chief teacher, and new teachers are able to observe these lessons before they have to perform their demonstration lesson. New teachers can also ask the principal to perform an additional lesson observation if they would like more feedback.

The Ministry sets overarching guidelines for all inductions which the boards of education can adapt and develop accordingly. Inductions are suggested to include at least 10 hours per week and 300 hours per year of training for newly appointed teachers. These hours include all school-based lesson study activities as well as off-site training which can include courses at the local Centre for Education, volunteer service or experience in the social service or business sectors.

While the content of the induction is determined individually by each education board, it typically includes the development of subject expertise through lesson study.

In the Tokushima prefecture, lesson study in induction must make up at least 90 hours over the course of the induction year. This amounts to approximately 3 hours per week. For new teachers, lesson study means becoming part of active professional learning communities and includes a large amount of observation and feedback, both of the new teacher observing experienced teachers and experienced teachers observing the new teacher.

Induction lays the groundwork for teachers’ ongoing professional development through lesson study (including mentoring from multiple teachers) over the course of their careers.

In Tokushima, lesson study in induction must include:

- 20-30 hours of peer observation (and must observe at least 10% of teachers in the school)
- 30 hours being observed by mentors/experienced teachers including co-teaching
- 30-50 hours of discussion with a mentor including discussion of lesson observations
- 3 lesson study research classes

In the Tokushima prefecture, teachers are appointed two different supervisors during their induction. The first is the home-school training supervisor who is responsible for recording and facilitating training at the school level. The second is the hub-school training supervisor who is responsible for four new teachers at various schools and coordinating the home-school supervisors. Both supervisors observe lessons and

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34 Ministry of Education, Culture, Sports, Science and Technology - Japan, 2015a
35 Jensen et al., 2016
36 Jensen et al., 2016
37 Jensen et al., 2016
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provide feedback for new teachers as well as organize additional training as part of induction (see Box 6). This provides a strong form of peer accountability (see Box 7).

**Box 6: Example reflection questions from mentor to mentee at the end of an observation**

- What do the analyses of the data on student learning tell us about the impact of our instructional decisions?
- Based on the data collected, did the lesson meet the students’ needs?
- How can we modify the lesson to help students reach the goals?
- How can we make modifications to Individualized Educational Plans (IEPs) to help students reach the goals?
- What student behaviors led to insights about your thinking?

From these reflective questions, the mentee is able to reach his or her own conclusion that what happens in the classroom is important for achieving the school’s goals.

*Source: Haithcock, 2010*

Alongside lesson study, supervisors provide training in other areas including subject-specific instructional techniques, use of teaching materials and textbooks, facilitation of student activities and other basic teacher responsibilities. Supervisors also work with new teachers to help them develop their own individualized development plans.

Mentoring new teachers requires a lot of time for the supervisors. The Ministry provides additional funds for schools to hire extra teachers to take some of the supervisor’s classes.

In other prefectures, new teachers receive mentoring from multiple senior teachers. They will often have a grade level lead teacher and a subject lead teacher as supervisors as well as a mentor from the prefecture. Some mentors are retired teachers who work 2-3 hours a week just mentoring new teachers. To become a mentor, the retired teachers must usually perform a demonstration lesson and undergo an interview with the relevant prefecture. Peer mentoring is also common. Young teachers at the school will often be selected to act as an additional mentor to the first-year teacher.

**Box 7: Lesson study and peer accountability in Japan**

While there is very little formal teacher accountability in Japan, there is a very strong sense of accountability to one’s colleagues. Because of the lesson study system, teachers are aware of one another’s teaching and teachers feel a responsibility to not let the group down. As a result, they take the time to develop high-quality lesson plans, teach these lessons well and provide valuable and considered feedback on the lessons of their colleagues.

*Source: Tucker, 2015*

Induction is highly coordinated between the school, the municipal board and the prefectural board. The prefectural board is responsible for monitoring the quality of inductions and works closely with school principals to ensure that new teachers are getting the support and development that they need.

Induction is seen as such a key part of a teacher’s practical training in Japan that some prefectures have extended their induction training to be two or three years to ensure that teachers are not too overloaded in their first year of teaching.
Induction is a key stage in teacher development in Japan. It provides a structured transition into the profession, setting an expectation for a career involving frequent teacher collaboration, observation and lesson study. Vitaly, it emphasizes the importance of teacher subject expertise and ongoing analysis of student learning.

3.3 Hiring exam assures quality and provides feedback to providers

The hiring exam set by the individual prefectural boards of education is used to drive candidate and ITE program quality. The effects of the exam are two-fold:

1. The exam ensures that all first-year teachers have the necessary knowledge and skills to enter the classroom as a result of their ITE and,
2. The exam provides a feedback loop to ITE providers on how their graduates are performing and helps identify the strengths and weaknesses of the program.

The exam takes place yearly and usually includes two stages. The first is a written component, testing subject expertise (for sample examination questions, see Box 8). The second is an oral component which can include interviews or lesson simulations. There is an increasing focus on this second component as determining whether a teacher has the right disposition and personality characteristics for teaching is seen as more important. While each prefectural board of education sets their exams independently there is limited variation across the 68 boards.

| Box 8: Example questions from Saitama prefecture’s employment exam for elementary school teachers |
| Question: Select the correct order of A to D, which describe the characteristics of sodium hydroxide aqueous solution. |
| A. A red litmus paper turns blue. |
| B. Phenolphthalein solution turns red. |
| C. BTB solution turns yellow. |
| D. A blue litmus paper turns red. |
| 1. ABC  2. BCD  3. AB  4. BD |

| Question: Choose one from the next 1 to 4 as the right value for \(-2^2 - (-3)^3\) |
| 1. -31  2. -13  3. 5  4. 23 |

| Question: When the decimal part of \(\sqrt{5}\) is \(\chi\), choose one from the next 1 to 4 as the right value for \(\chi^2 + 4\chi + 4\) |
| 1. 5  2. 10  3. 16  4. 25 |

*Source: Appendix to Jensen et al., 2016* 38

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Each board spends large amounts of time and effort developing and designing the exams. For example, in Saitama prefecture, 15 full-time staff (as well as many other part-time and advisory staff) work on preparing and conducting the exam. 39

The hiring exam is different to teacher registration or certification. Teachers in Japan are automatically certified after completion of their ITE program. Many more teachers are certified in Japan than will ever be employed to teach. For example, in 2012-2013 there were 28,300 newly certified elementary teachers for only 13,600 public school positions. 40 Therefore, the hiring exam, not teacher certification, acts as the rigorous assessment of candidate quality. Each prefecture ranks candidates based on their employment exam score, rather than using a pass-fail measure. Schools look at the ranking of the applicant and include this in their hiring decisions. As a result, only the high-achieving candidates will be offered a job, ensuring quality and raising the status of the profession.

The hiring exams are notoriously competitive. For example, in 2013, 180,000 candidates took hiring exams but only 31,000 were hired. 41 This is a progression rate of only 17%.

Hiring exams rank candidates (instead of labeling them as pass-or-fail). This continuous measure means that there is no passing score above which all candidates are considered equal. Information about the relative quality of candidates is provided to the system without necessarily constricting supply.

Having a rigorous exam at the hiring stage is suited to systems with many ITE providers of varying quality. The universities have to annually publish the employment rates of their graduates and universities are ranked based on this employment and destination data (see Appendix 3 for an example of data published). In this way, providers have incentives to improve their programs to ensure that a higher proportion of their graduates do well in the employment exam. If this is not the case, the reputation of their ITE programs is greatly diminished. For example, Tokyo Gakugei University responded to its graduates’ results from employment examinations by setting a goal for 2004-2010 that 60% of graduates would progress through the hiring exam process. 42 This rigorous assessment at hiring contrasts with filters earlier in the pathway, such as at selection into ITE, which cannot provide a feedback loop to ITE providers about the quality of graduates.

Figure 6 shows potentially different outcomes from quality filters at different points on the teacher development pathway. An assessment where teachers either pass or fail a minimum standard at the beginning of ITE will cut out the worst performers, but will not influence the vast majority of teaching candidates. However, a quality filter at the employment stage can have more impact on general candidate quality by giving ITE providers information on the relative performance of their graduates. This establishes a feedback loop that creates incentives for program improvement, raising quality across ITE providers.

39 Jensen et al., 2016
40 Ministry of Education, Culture, Sports, Science and Technology - Japan, 2015b
41 Ministry of Education, Culture, Sports, Science and Technology - Japan, 2015b
42 Yasuyuki, 2004
Figure 6: Comparison of the impact on candidate quality between different filter points

Setting minimum standards for entry into ITE filters early in the pathway

Feedback loop to providers through employment exam incentivises ITE providers to raise quality

Low | Candidate quality | High
---|------------------|---
Low | High

Candidate quality

Low | High
---|---
4 Lessons for other countries

While every education system operates in its own context and faces unique challenges, lessons can be drawn from the Japanese example that can apply to any system. The following are some of the lessons that can be drawn from Japanese teacher preparation and development for international systems looking to reform ITE.

Teacher development doesn’t end with ITE

In Japan, one of the main goals of ITE is to facilitate a mindset of continuous learning in beginning teachers that is continued throughout their careers. ITE is used to develop the knowledge for Level 2 teaching (where teachers can explain the meanings behind concepts) and establish the foundations for Level 3 teaching (where teachers provide students with the opportunities to be independent learners) by incorporating skills in formative assessment, collaborative lesson design and effective classroom observation. Graduate teachers then use these skills as part of the lesson study process in their practicum, induction, and ongoing professional development. Teachers engage in lesson study throughout their careers, always growing, building their teaching expertise and ultimately facilitating the learning of others.

Lesson study can be used to help teachers with low content knowledge

Lesson study is at its core a process to help teachers develop deep subject expertise. As part of a lesson study, teachers have the opportunity to deeply analyze curriculum materials with the support of knowledgeable others. This allows teachers to develop their content knowledge and pedagogical content knowledge in a situated way. Compared to a lecture, this is a more powerful way for beginning teachers to learn content knowledge, as it relates directly to their practice and links the content knowledge with the pedagogical content knowledge.

Based on his experiences, Dr. Akihiko Takahashi has five features for implementing lesson study in a US context (or anywhere) to ensure that it is the most effective:

1. Participants engage in lesson study to build expertise and learn something new, not to refine a lesson
2. It is part of a highly-structured, school-wide or sometimes district-wide process
3. It includes significant time spent on kyouzai kenkyuu – the deep analysis of curriculum materials
4. It is done over several weeks rather than a few hours
5. Knowledgeable others contribute insights during the post-lesson discussion and during planning as well

An important thing to remember about lesson study is that there is value in the practice even when you are not the one teaching the lesson. This is particularly important for beginning teachers. While they may only perform 1-2 lesson studies per year, they will have numerous opportunities to observe and participate in the reflective discussions of other more advanced teachers at their school. This stimulates early career teachers or teachers with low content knowledge to learn more about the content.

As part of the lesson study process, the importance of the knowledgeable others cannot be understated, particularly when doing lesson study with teachers starting with low content knowledge. That injection of

43 Takahashi & McDougal, 2016
44 Dr Takahashi webinar
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expertise and feedback from a knowledgeable other means that teachers won’t be stuck in an echo chamber. A good knowledgeable other should be like a good teacher. Rather than telling the teachers how to do something the knowledgeable other should ask thought provoking questions and provide the teachers with resources to help them develop their practice themselves.\(^{45}\)

**Professional development should be ongoing, rooted in practice and focused on student learning outcomes**

Lesson study is effective adult learning because it is problem-based, collaborative learning that is done over a significant period of time.\(^{46}\)

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*Most importantly, the whole process takes place within the school, ensuring that the learning is deeply rooted in practice and focused on student learning outcomes.*

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One of the important features of lesson study is the ability to observe and analyze the impact that the teacher has had upon the students. It is very important for the teachers to carefully observe the students because a lot of teachers don’t realize that the way they are teaching is not progressing the students’ learning.\(^{47}\) A teacher can perform lesson after lesson and never realize that the way they are teaching is not getting through to the students. When other teachers are in their classroom observing not only the way they are teaching but also the way students are learning (or not learning), the teacher can properly understand the impact they are having on student learning in their classroom. Importantly, lesson study requires the input of a ‘knowledgeable other’ who helps provide guidance, materials and valuable feedback during the reflective part of lesson study.

In this way, lesson acts as the impetus for changing a teacher’s behavior and motivating them to want to improve.

**Practicums can be shorter but more effective**

Requiring longer periods of student teaching as part of ITE will have no impact if candidates are not given the opportunity to receive quality feedback and reflect on their practice.

We often think that more is always better, particularly when it comes to teaching practice, but Japan’s student teaching approach offers a counter to this. Rather than including long placements, Japanese ITE programs offer shorter, more intensive group placements where candidates are supported and guided by an experienced teacher.

A few features of Japan’s practicums are worth noting:

1. They are group-based which means there is lots of collaboration as well as peer accountability. Student teachers will often have to deliver a lesson and based on the reflection, one of their peers will have to deliver the same lesson. This means that the first teacher feels a communal responsibility to design a high-quality lesson so there will be fewer revisions for his/her peers. This intensive group-based approach increases the quality of the practical training without increasing the cost, time or resource burden on schools.

\(^{45}\) Dr Takahashi webinar  
\(^{46}\) Knowles, Holton, & Swanson, 2015; Timperley, Wilson, Barrar, & Fung, 2007  
\(^{47}\) Dr Takahashi webinar
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2. Student teachers are carefully guided by their supervisors. When they submit a lesson plan they will often have to revise it several times based on feedback from their supervisor. The supervisor does not look at it briefly and give surface-level feedback. He/she looks at it carefully and poses reflective questions, requiring the student teacher to argue why his/her approach is best.

3. Reflection upon the lessons is key, not just reflection in general. After he/she teaches a lesson, the student teacher has an hour-long discussion about it with his/her peers and supervisor. Reflection is focused on the impact the lesson had on the students and where it can be improved in future. Improvement cannot happen without reflection, and that’s why longer practicums without deep reflection upon a lesson with a supervisor won’t change how student teachers teach.

Give beginning teachers the time to focus on the things that matter during induction

Teachers never have enough time to do everything they are supposed to do, and beginning teachers are no exception. Therefore, it is important to focus teachers’ time on the things that are reasonable and appropriate for them to be doing given their skillset.

In Japan, it is accepted that teachers, and in particular beginning teachers, are not equipped with the necessary skills and knowledge to design their own curriculum. The role of teachers is to examine the curriculum and adapt it to suit their students’ needs.

The kyouzai kenkyuu step in lesson study facilitates this as it helps teachers to develop the skills to analyze curriculum materials and make choices about what to include and what is less important. Textbooks often contain a wealth of information, and teachers need to develop the skills to see what material is the most useful to accomplish each learning goal of their students.48

Lesson study also allows teachers to share resources in schools so that beginning teachers are not wasting their first few years frantically creating material for their classes. This allows them to focus on the what’s important like developing and reflecting upon their teaching practice so that it has an impact on student learning.

Use quality filters for continuous improvement

One of the most interesting features of the Japanese employment exam is the way it is used and reported. It is a continuous rather than a binary measure. Outside of Japan, many registration or licensure tests only require participants to meet a particular bar. Instead in Japan, the prefectures create a rigorous quality assessment at the hiring stage and employ only the highest performers. Providers are not incentivized to get their graduates across a particular bar, but instead to continually improve their programs to raise the quality of their graduates to ensure they score higher on the exams.49 Providers also receive rich data from the exams as to where their graduates are falling down so that they can focus their efforts in these areas.

Providers have to publish statistics in annual reports about the destinations of their graduates (i.e. how many are hired into full time roles). This creates incentives for providers to use the data for continuous improvement as they strive to remain competitive.

48 Dr. Takahashi webinar
49 Roberts-Hull, Jensen, & Cooper, 2015
Appendix 1 - Division of responsibilities

Ministry of Education, Culture Sports, Science and Technology (MEXT)
- Establish a system framework
- Establish national standards
- Secure funding for developing education conditions

Prefectural boards of education
- Establish and manage high school and special needs education schools
- Responsibility for personnel matters and paying elementary and junior high school teachers
- Guidance, advice, assistance
- Requests and guidance for corrections under certain conditions

Municipal boards of education
- Establish and manage elementary and junior high schools
- Supervision of elementary and junior high school teachers
- Responsibility for paying salaries of teachers of municipal schools
- Guidance, advice, assistance

Prefectural Schools

Municipal Schools

Salaries of teachers at municipal schools are paid by the national government

Source: NCTD, 2016
Appendix 2 - Initial teacher education programs in Japan

Initial teacher education programs in Japan are run by universities through a faculty or affiliate institution. There are approximately 1,300 providers who run ITE programs. Some ITE programs are run through education faculties and specialize in teacher education. These courses have a limit on the number of places they offer annually, making the process highly competitive and raising the quality of candidates.

Other programs are run through an ‘open system’ where non-education faculties offer ITE as an addition to a specialist degree such as science. These programs do not have a capped number of places. Once being admitted to the specialist degree, anyone can opt-in to the additional teacher training. Students who add teacher training onto their specialist degrees make up approximately 60% of ITE graduates.

As a result of the open system, ITE programs do not have consistently rigorous admission standards. While everyone must pass an admission exam to get into university, these exams vary in quality and rigor between faculties and universities.

All ITE programs are overseen by MEXT. Providers have some degree of autonomy over their programs but must adhere to the general requirements set out in the Act of Teachers’ Certificates and the Order of Regulations of the Act of Teachers’ Certificates. These laws detail the courses that must be offered as part of an ITE degree and the required minimum number of credit hours per course. These differ for grade levels (elementary, junior high and senior high) and for license/degree type (masters, undergraduate, 2-year college).

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50 Department of Education, 2012
51 Department of Education, 2012
52 Department of Education, 2012
Appendix 3 - Example of data published from Japanese ITE programs

Careers after graduation (Undergraduate students)

Source: Tokyo Gakugei University, 2016
Bibliography


NCTD (2016) National Center for Teachers’ Development.


