

Program Development for Enhancing Teachers' Competencies in Teaching Railway Control and Maintenance in Vocational Colleges under the Office of Vocational Education Commission

Kosol Lertlam¹, Chaiyuth Sirisuthi¹ & Vanich Prasertporn¹

¹ Faculty of Education, Northeastern University, Khon Kaen Province, Thailand

Correspondence: Chaiyuth Sirisuthi, Faculty of Education, Northeastern University, Khon Kaen Province, Thailand.

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Abstract

Teacher competency is crucial for the quality development of learners. Teachers with high competence in learning management will result in high-quality learners. This research aims 1) to study the components and indicators of teachers' competency in teaching railway control and maintenance. 2) to study current conditions, desirable conditions, methods of development, and needs for the development of teachers' competency in teaching railway control and maintenance. 3) to design and develop a teachers' competency-enhancing program in teaching railway control and maintenance, and 4) to study the results of implementing the teacher competency-enhancing program in teaching railway control and maintenance. The methodology was research and development conducted in 4 Phases as follows according to the objectives. The results showed that 1) Components and indicators of teachers' competency in teaching railway control and maintenance have 5 components, and 17 indicators, confirmed by experts, are appropriate at the highest level. 2) Current condition, teachers' competency in teaching railway control and maintenance, overall was moderate level. The desirable condition, overall was at the highest level. Competency development methods consist of (a) Training, (b) Self-learning, (c) Workshops, (d) Study visits, and (e) Work practice in the workplace, and the priorities of the needs for competency development, including (a) Self-development, (b) Ethics and professional ethics of teachers, (c) Measurement and evaluation of learning outcomes, (d) Curriculum administration and learning management, and (d) Building relationships and cooperation with the community for learning management, respectively. 3) Teachers' Competency Enhancing Program in Teaching Railway Control and Maintenance consists of (a) Principles, (b) Objectives, (c) Model and development methods, (d) Contents and developing activities consisting of 5 Modules, and (e) Measurement and Evaluation. The result of the program evaluation by qualified experts was appropriate, utility, and possibility at the highest level. 4) The results of implementing the teachers' competency-enhancing program in teaching railway control and maintenance were used. It was found that (a) knowledge of teacher competency in teaching railway control and maintenance before development received an average score of 17.70 out of 30, representing 58.99% after development, receiving an average score of 25.90, representing 86.33%. Knowledge after development was higher than before development. (b) Teachers' competencies and overall performance before development were at a moderate level. After development was at the highest level, and (c) the results of the program satisfaction assessment by participants overall and all aspects are at the highest level.

Keywords: competency enhancing programs, teacher competency in a rail transport system, vocational education

1. Introduction

Policies and 20-year national strategies (2018-2037) related to the production and development of manpower and raising the level of production, and quality of labor to increase the country's competitiveness. The development of human potential throughout life supports the growth of the country by reforming the building project and education management system. As for the production of vocational education manpower, it is necessary to change the teaching and learning management, using appropriate technology. Learners have good working attitudes. Professional experience in the workplace must take into account the availability of production resources by emphasizing allowing the business and industry to participate in the management of education in a concrete way (Boonyasophon, 2012), which is in accordance with the National Education Act B.E. 2542 and the amendment (No. 2) B.E. 2545 focused on teaching and learning management that gives learners the opportunity

to learn for life according to their aptitude and interest by emphasizing learning from real practice according to the potential of the learners. Giving importance to the management of bilateral vocational education, both at the vocational certificate (vocational certificate) level and the higher vocational certificate (high vocational certificate) level, which is educational management that emphasizes practice. Provide students the opportunity to study and learn along with vocational training in the workplace or various scientific sources where students will gain work experience directly from real workplace sources and earn income during the study in line with the 12th National Economic and Social Development Plan, which focuses on developing people of all groups and ages to have the basic knowledge. Life skills to develop performance skills of the workforce in line with the needs of the labor market and ready to step into the world of work and compete with quality. According to the linkage of national policies and strategies consisting of 1) the National Strategy (2018-2037), 2) The Twelfth National Economic and Social Development Plan (2017-2021), and 3) The Third Logistics System Development Strategic Plan (2017-2021), including strategies and plans for the development of the country's transport infrastructure from 2015-2022, found that Thailand has planned to invest in the development of rail transport infrastructure. It consists of a double track train, Mass Rapid Transit, and high-speed trains including new railway lines, it is the main proportion, more than 80 percent of the total transport infrastructure investment budget. According to the country's investment plan in the development of logistics infrastructure for the rail transportation system, it was found that in the year 2022, there will be a need for personnel in the position of engineers and technicians to work in the operation and maintenance of 7,280 people, while the current education sector plans to produce only 5,670 engineers and technicians in such fields. Action plan to prepare the manpower in the parts that are not able to produce enough, including developing and upgrading teaching and training in the field of rail transportation at present in order to support the investment in rail transportation infrastructure that will occur in the near future. (Sub-Committee on Driving Manpower for Infrastructure Logistics Professional Groups National Qualifications Framework Committee, 2018)

Teacher competency enhancement department of technical control and Maintenance of Rail transportation systems of the institution under the Office of Vocational Education Commission an interesting model and method of teacher development is the development method in the form of a program. From a study of the concept of program development by Caffarella (2002), and Sanrattana (2013), was found that the program is a plan or a series of experiences that are systematically arranged, and contain development steps created by the application. From the interconnected elements of principles, concepts, and theories that are the basis of program development to lead to the implementation of the objectives or goals within the context of development in each organization and from the study of research related to the development of teachers and educational personnel found that development programs contribute to the development of personnel competence, higher operational skills resulting in satisfactory efficiency of operations.

According to the above-mentioned importance, the researcher as a school administrator under the Office of the Vocational Education Commission aware of the problems and is interested in developing teachers in teaching railway control and maintenance schools under the Office of the Vocational Education Commission therefore interested in studying and researching "Program Development for Enhancing Teachers' Competencies in Teaching Railway Control and Maintenance in Vocational Colleges under the Office of Vocational Education Commission" will help school administrators and teachers to have the opportunity to be strengthened and develop learning management that will lead to the development of learning achievement at the school level. To use as a guideline for improving quality and to develop the competencies of teachers teaching the subject Techniques for control and maintenance of rail transportation systems. Educational institutions under the Office of the Vocational Education Commission This will result in raising the overall quality of education in the country.

2. Research Theoretical Framework

The researcher has synthesized principles, concepts, and theories of academics in management to provide a theoretical framework for research as follows:

- 1) Components of teachers' competency in teaching railway control and maintenance consisted of 1) self-development, 2) ethics and professional ethics of teachers, 3) curriculum administration and learning management, 4) learning measurement and evaluation, and 5) Building relationships and cooperation with communities for learning management (McClelland, 1973; The Secretariat of the Teachers Council of Thailand 2019; Wangmeejongmee, 2017; Srinok & Prasertcharoensuk, 2014; Sriwongrat, 2016; Turkish Republic Ministry of National Education, 2006; The National Institute of Education (NIE), 2009; General Teaching Council for Northern Ireland, 2011).

- 2) Methods for teachers' competency development in teaching railway control and maintenance consists of 1) Training, 2) Self-development, 3) Workshop, 4) Study visit, and 5) On-site training (Mongkolvanit, 2012; Taengchuang, 2015; Somunchan, 2013; Thongkham, 2019)
- 3) Program components, consisting of 1) Principles, 2) Objectives, 3) Model and development methods, 4) Contents and development activities, and 5) Program evaluation (Jomhongpipat, 2010; Kongsuk, 2011; Julsuwan, 2011)
- 4) The program development process consists of 1) analysis to find the goals, 2) planning for the preparation of the program, 3) creating the program for training, 4) applying the program to trial, and 5) evaluating the program to bring the assessment of the results acquired to develop the program (Caffarella, 2002; Barratt, 2009; Sanrattana, 2013)
- 5) Evaluation of the program consisted of 1) Appropriateness, 2) Utilities, and 3) Feasibility (Songtiang, 2005; Jomhongpipat, 2010)

This research's theoretical conceptual framework is shown in Figure 1.

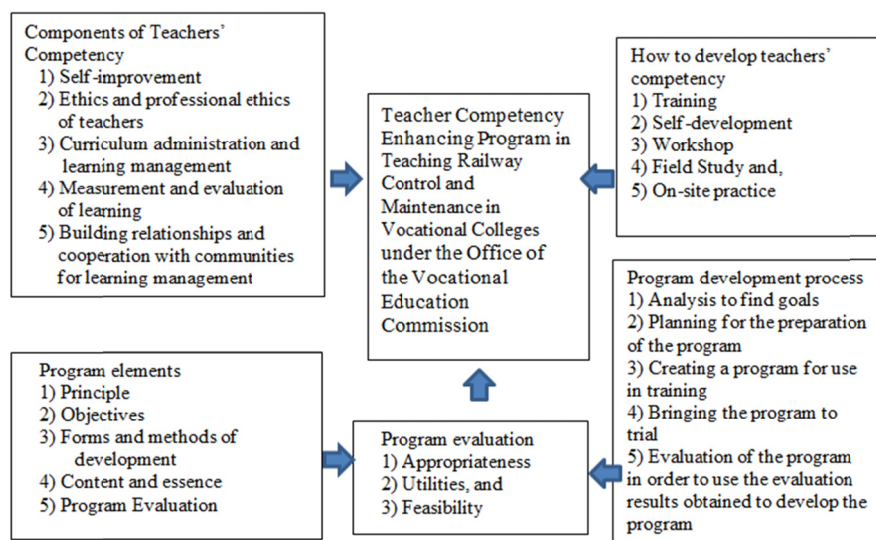


Figure 1. Theoretical framework for research

3. Objectives of the Research

- 1) To study the components and indicators of teachers' competency in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission
- 2) To study current conditions desirable conditions, methods of development, and needs for the development of teachers' competency in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission
- 3) To design and develop a teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission
- 4) To study the results of implementing the teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission developed to use.

4. Research Methodology

This research was research and development. The research method was divided into 4 phases as follows.

Phase 1: Study of teachers' competency components and indicators in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission. The group of informants who examined the suitability of components and indicators was 5 experts by purposive sampling. The tools used for the collection were: The suitable assessment form of components and performance indicators with an IOC value between .80-1.00. Data were analyzed using statistics: mean, and standard deviation.

Phase 2: Study of current conditions desirable conditions, methods of development, and needs for the development of teachers' competency in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission.

1) Population was the vocational college administrators' rail transport teacher, the head of curriculum development, the head of instructional media division, and the head of measurement and evaluation in college opened for teaching in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission, 7 places, 147 people.

2) The sample group was vocational college administrators, rail transport teachers, the head of curriculum development, the head of instructional media division, and the head of measurement and evaluation in college opened for teaching railway control and maintenance 7 places under the Office of the Vocational Education Commission, totaling 63 people obtained by purposive sampling.

3) Tools used to collect data are the current condition and desirable condition questionnaires. The scale is about 5 levels with an IOC value between .80-1.00, a reliability value for the current condition of .95, and a desirable condition of .97.

4) Statistics used in data analysis were frequency distribution, percentage, mean, standard deviation, and Modified Priority Needs Index (PNI_{modified}).

Phase 3: Design and development of teachers' competency-enhancing programs in teaching railway control and maintenance in vocational colleges. Informants in focus groups to develop teacher competency programs included 7 experts who were by the specified criteria and a group of informants responsible for assessing the appropriateness, possibility, and utility of the program consisted of 12 qualified people who have met the specified criteria. The tool used to collect data was a focus group discussion form and the appropriateness assessment form with IOC values between .80-1.00. Statistics used in data analysis were mean and standard deviation.

Phase 4: The study of the results of implementing the teachers' competency-enhancing program. The informants were 10 administrators and teachers in teaching railway control and maintenance in vocational colleges in vocational colleges under the Office of the Vocational Education Commission that implemented the program. The tools used to collect data were: the test of knowledge about competency, and teacher competency assessment form, and the satisfaction questionnaire with an IOC value between .80-1.00. Statistics used in data analysis were percentage, mean, and standard deviation.

5. Research Results

Results of the study of components and indicators of teachers' competency in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission consists of 5 components and 17 indicators as follows: 1) Self-development consists of 3 indicators: (1) study and find out knowledge, pursue new knowledge, (2) knowledge application, and (3) vision creation. 2) Teacher professional ethics and ethics consisted of 5 indicators: (1) learners, (2) professional, (3) work, (4) personal, and (5) social/public. 3) Curriculum administration and learning management consisted of 4 indicators: (1) curriculum creation and development, (2) learning management design, (3) student-centered learning management, and (4) use and development, media innovation, and technology for learning management. 4) Measurement and evaluation of learning results consisting of 3 indicators: (1) actual measurement and evaluation, (2) planning, designing, creating, and developing measurement and evaluation tools, and (3) systematic evaluation. 5) Building relationships and cooperation with communities for learning management consisted of 2 indicators: (1) cooperation in building networks, and (2) promoting student development activities. Evaluation results of the suitability of components and indicators by 5 experts found that overall was appropriate at the highest level.

The results of the study of the current conditions of teachers' competencies the overall level is moderate, desirable conditions overall, it was at the highest level, and methods for enhancing teacher competency adhere to the development principle 70: 20: 10, which includes 10% program learning, 20% learning from others, and 70% experiential learning, using various development methods, namely 1) training, 2) In person learning, 3) workshop, 4) study visit, and 5) work practice in the workplace.

The results of the development of the teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges consist of 2 parts: 1) a Teachers' competency-enhancing program in teaching railway control and maintenance in vocational college and 2) a manual for using the program. The components of the program are 1) principles, 2) objectives, 3) Model and methods for development, and 4) content and development activities with 5 modules: Module 1: Self-development, Module 2: Teacher Professional Ethics, Module 3: Design and Learning Management, Module 4: Learning Measurement and Evaluation, and Module 5:

Networking for Learning, time used in a development period of 160 hours and 5) program evaluation. The results of the program evaluation by 12 experts found that it was appropriate, possible, and utility at the highest level.

The results of implementing the teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges found that the knowledge of teachers' competency in teaching railway control and maintenance before development received an average score of 17.70 out of 30, representing 58.99% after development, receiving an average score of 25.90, representing 86.33%, knowledge after development was higher than before development. 2) Teachers' competencies and overall performance before development were at a moderate level, after development was at the highest level, and 3) the results of the program satisfaction assessment by participants overall and all aspects are at the highest level.

6. Discussion

According to research results, there are some interesting issues that can be discussed as follows:

Components and Indicators of teachers' competency in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission confirmed by experts, overall, there were at the highest level. These reasons for research results are because teachers in the Department of Control and Maintenance Techniques of Rail Transport Systems should have competencies that comprehensive knowledge, abilities, skills, and desirable characteristics both in the curriculum creation and development. The design of learning activities is consistent and systematic by focusing on the importance of students, cultivating morality, ethics, democracy, and exchange of knowledge to generate new knowledge both academically and professionally, innovations are created for self-improvement and ongoing work development, behavior is correct in accordance with the professional ethics of teachers, professional self-development and professional responsibility, building good relationships and networking with parents, communities and other organizations, both public and private support and promote learning management, ability to measure and evaluate according to real conditions, planning, designing, creating and developing tools for measuring and evaluating used in teaching and learning effectively. This is in line with the research of Jutasong, Sirisuthi, and Phuse-on (2016) who conducted research on the development of a program for enhancing teachers' learning management competencies under the Office of Non-formal Education and Informal Education. It was found that the components and indicators of teachers' learning management competency under the Office of Non-formal Education and Informal Education consist of 6 components, 30 indicators, namely 1) curriculum creation and development for adult learners, 2) knowledge based on learning content, 3) learning design for adult learners, 4) organizing a variety of learning processes, 5) using media and developing innovative media in learning management, and 6) measurement and evaluation confirmed by experts, overall, it was at the highest level.

Current condition of teacher competency in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission classified by components, the overall was at the moderate level, desirable conditions overall components at the highest level, and methods for enhancing teachers' competency in teaching railway control and maintenance according to the opinions of the respondents can be sorted from descending order, namely training, self-learning, workshop, study visit, and practice in the workplace. This may be due to the current field of Technical Control and Maintenance of Rail Transportation Systems is a newly developed course to support the production and development of manpower in modern industrial rail transportation systems by providing teachers with skills and knowledge in similar subject areas taught in the aforementioned disciplines. These caused a lack of skills in this field directly. These caused problems in laying the foundation for knowledge and competence in the correct rail transportation system for students which is the teaching and learning quality. Teachers need to develop their skills, knowledge, and expertise in the field of technical control and maintenance of rail transport effectively consistent with the research of Sanguankrua (2019) conducted research on teacher competency enhancement programs in proactive learning management according to STEM education under the Office of the Basic Education Commission found that the current state of teacher competency in proactive learning management according to the STEM approach under the Office of the Basic Education Commission, the overall level is moderate, and the desirable state of teacher competency in proactive learning management according to the STEM education approach under the Office of the Basic Education Commission, overall, it was at the highest level. Methods for enhancing teacher competency in proactive learning management based on the STEM education approach under the Office of the Basic Education Commission are sorted in descending order of frequency, including workshops, self-learning, job teaching, mentoring, and supervision process.

Teacher competency-enhancing program in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission consisted of the following: 1) principles, 2) objectives, 3)

Model and methods for development, and 4) content and development activities with 5 modules: Module 1: Self-development, Module 2: Teacher Professional Ethics, Module 3: Design and Learning Management, Module 4: Learning Measurement and Evaluation, and Module 5: Networking for Learning, time used in a development period of 160 hours and 5) program evaluation. The results of the program evaluation by 12 experts found that it was appropriate, possible, and utility at the highest level. In this regard, the development of a teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges with a program may be a method that can develop teachers' competencies because teachers in the Technical Program in Control and Maintenance of Rail Transportation Systems play an important role in enhancing knowledge teacher's abilities to produce and develop manpower in the rail transportation system to support in the modern industry which requires self-development through a variety of methods and must adjust the teaching and learning process to keep up with changes, not just only a teacher but must be a teacher or facilitator of learning and must create skills, knowledge, professional competence in the rail transportation system in the future consistent with the research of Jomhongpipat (2010) research on Developing a learning management leadership teacher development program According to the educational reform guideline found that 1) the teacher-leader development program, the evaluation results were vision, principles, objectives, content, process, structure, and evaluation. The evaluation process of the program was divided into 2 phases: manage learning in a simulated situation which is a workshop with steps, namely the exploration of the previous experience joint planning stage. Stage to build knowledge and understanding to achieve concepts, stage to apply concepts Stage 2: Field learning management leadership development program. It is a continuous development of teacher leadership skills from Phase 1 in real situations for 1 semester, with the steps being the implementation stage, follow-up supervision feedback and reinforcement stage, the strengthening seminar.

The results of implementing the teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges under the Office of the Vocational Education Commission used the results as follows: the knowledge of teachers' competency in teaching railway control and maintenance before development received an average score of 17.70 out of 30, representing 58.99% after development, receiving an average score of 25.90, representing 86.33%, knowledge after development was higher than before development. 2) Teachers' competencies and overall performance before development were at a moderate level, after development was at the highest level, and 3) the results of the program satisfaction assessment by participants overall and all aspects are at the highest level. This may be because the teacher Department of Control and Maintenance Techniques of Transport Systems learned from the learning module with many interesting formats, there are varieties of learning activities and development methods can be. It stirred up interest very well. In addition, teachers in the Department of Control and Maintenance Techniques of Transport Systems have undertaken activities as assigned based on theoretical concepts and principles to create module lessons consistent with the research of Phannuek (2011) has conducted research on the research and development of the basic education school administrator competency development program and found that 1) the basic education school administrator competency development program consisted of 4 parts: Part 1: Leadership, Part 2: Details of the basic education school administrator competency development program, Part 3 Evaluation tools for basic educational institution administrator competency development programs in the field, and Part 4 Guidelines, conditions, indicators for success in implementing the basic education institution administrator competency development program 2) Educational institution administrator competency development program Effectiveness of the basic education can be seen from 1) the experimental group reacted to the basic education school administrator competency development program, overall and all aspects were at a high level. 2) After the development according to the competency development program, the basic education institution administrators in the experimental group had the knowledge and have the knowledge and skills in accordance with the competency of administrators of basic education institutions new knowledge and skills are put into practice. The performance from the performance of duties was significantly higher than the control group at the .01 and 0.5 levels. 3) After the development according to the competency development program, the basic education institution administrators in the experimental group had knowledge and skills according to Administrative competencies according to the basic education school administrators' competencies The performance from the performance of duties was significantly higher than the control group at the .01 level.

7. Conclusion

The main result of this research was "The Teachers' Competency-enhancing Program in Teaching Railway Control and Maintenance in Vocational Colleges under the Office of the Vocational Commission" consists of 1) principles, 2) objectives, 3) Model and methods for development, and 4) content and development activities with 5 modules: Module 1: Self-development, Module 2: Teacher Professional Ethics, Module 3: Design and Learning

Management, Module 4: Learning Measurement and Evaluation, and Module 5: Networking for Learning, time used in a development period of 160 hours and 5) program evaluation. The results of the program evaluation by 12 experts found that it was appropriate, possible, and utility at the highest level. This program is appropriate and can be applied for teachers' competency development in the vocational college.

8. Suggestion

8.1 Suggestions for Use

- 1) Office of the Vocational Education Commission should emphasize, and give value to the development of teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges because the development of the program will have a continuous and systematic nature, will pass on the development of teacher competency rail transport system of educational institutions under the Office of the Vocational Education Commission further efficiently.
- 2) Office of the Vocational Education Commission should promote and support speakers with knowledge and ability or have specific expertise in line with the content of the program in order to pass on the knowledge to those who are developing, to gain knowledge, understanding, and be able to apply in teaching and learning effectively.
- 3) Office of the Vocational Education Commission Teacher competency assessment results should be used for the Technical Program in Control and Maintenance of Rail Transportation Systems and credits a score for evaluating the performance of teachers under the Office of the Vocational Education Commission in order to reinforce self-development.

8.2 Suggestions for Further Research

- 1) There should be a component analysis research to confirm the competency of teachers in the Technical Program in Control and Maintenance of Rail Transportation Systems to develop teacher competency for maximum efficiency and effectiveness.
- 2) There should be follow-up research or further education in terms of applying the program to enhance other competencies of teachers under the Office of the Vocational Education Commission.
- 3) Teacher competency building programs should be implemented in the Technical Program in Control and Maintenance of Rail Transportation Systems obtained from this research to be used to develop with other educational units as a guideline for research and knowledge development, other professional modern technologies.
- 4) There should be qualitative research about implementing the teachers' competency-enhancing program in teaching railway control and maintenance in vocational colleges to take action seriously.

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Authors contributions

Mr. Kosol Lertlam and Assistant Professor Dr. Chaiyuth Sirisuthi were responsible for the study design and revising, Mr. Kosol Lertlam was responsible for data collection, Assistant Professor Dr. Vanich Prasertporn was responsible for data analysis, Mr. Kosol Lertlam drafted the manuscript and Assistant Professor Dr. Chaiyuth Sirisuthi revised it, All authors read and approved the final manuscript, and Professor Dr. Chaiyuth Sirisuthi was responsible for the publication and corresponding manuscript.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Obtained.

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Data sharing statement

No additional data are available.

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