

Worksheets for designing Inter-School Collaborative Learning based on the Instructional Design Model

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Inter-School Collaborative Learning (ISCL) is a teaching method wherein pupils collaborate with pupils in other schools by using various online and offline communication tools. The instructional design model for ISCL was developed, which is based on an analysis of teachers' curriculum design and the communication process among pupils. For evaluating the ID model, three types of worksheets were developed: the planning worksheets, the reflection worksheets and the feedback worksheets which teachers used to consider learning objectives and the learning process based on the ID model for ISCL. In an experimental study, after 24 teachers used the worksheets to conduct their own ISCL plans, they confirmed the validity of the framework model and said that the procedure model had helped them to design their plans.

Keywords: collaborative learning, instructional design, information education, elementary school

Background

Inter-School Collaborative Learning (ISCL) is an interesting teaching method for school teachers. Pupils collaborate with other pupils in distant classrooms by using various online and offline communication tools such as email, BBS (Bulletin board system), video conferencing, letters, face to face meetings, and parcel delivery services. Harris (1999) offered three types of activity structure from educational telecomputing; Problem Solving Projects, Information Collections, and Interpersonal Exchanges. ISCL corresponds to the interpersonal exchanges. Harris picked out six types of interpersonal exchange and discussed opportunities and choices for joining telecollaborative projects. Actually there are international and domestic collaborative projects such as iEARN: International Education and Resource Network (<http://www.earn.org/>), Kidlink (<http://www.kidlink.org/>), Comenius – European Cooperation on School Education (in EU, <http://ec.europa.eu/education/programmes/lp/comenius/>), and The 2learn Education Society (in Canada, <http://www.2learn.ca/>).

However, teachers who are trying to conduct ISCL encounter some problems. How do they find partners to collaborate with? How do they use online and offline communication tools in an effective way? Most importantly, how do they connect online collaborative activities to their

daily school curriculum? To be sure, some collaborative projects mentioned above provide useful guidelines to solve these problems. For all this support for teachers, they have to select which project is suitable for their pupils and decide learning objectives in consideration of the condition of their pupils.

This author developed an instructional design model for ISCL (Inagaki, 2005a). This model supports teachers in considering learning objectives in their ISCL plan and working the ISCL learning process into their school curriculum and subjects. Experiencing ISCL practice under a well-designed curriculum, pupils acquire a variety of knowledge and learning abilities. From previous research, six types of learning objectives have been identified.

- **Communication skills:** Pupils train how to present and how to discuss information clearly through experiencing ISCL. Communicating with unfamiliar pupils in other distant classrooms bring a low-context situation where pupils have to communicate with each other considerately.
- **Information Skill:** Using communication tools such as e-mail, video conference, and BBS with the partner pupils is a chance to improve their information skills including understanding characteristics of various media, expressing their opinion in consideration of their partner, and moral education with regards to information.
- **Motivation for learning:** Discussion and collaborative activities in ISCL bolster the pupils' willingness to learn. Not only does the existence of their partner encourage them, but also information from the distant area drives and increases the intellectual curiosity of the pupils.
- **Human Relationship:** Pupils encounter distant pupils on the Net. They introduce themselves to each other and build communication links. Their teachers coordinate a human relationship among pupils to foster fellow feeling among distant schools.
- **Collaboration Skill:** Division of roles and cooperation in coordinating a collaboration scheme are also referred to as one of the learning outcomes. Through collaborative activities to make some products such as web pages, books, music, plays, and jointly-hosted events, the pupils find their individual roles and how to be cooperative.
- **Understanding the difference and the commonality in regional characteristics, culture, and attitudes:** Collaboration with other schools encourages the pupils to understand their own school and district. Using international exchange opportunities, pupils consider other cultures, learn to empathize with others and understand their own cultures.

For the purpose of this study, three types of worksheets were developed, which teachers used to consider learning objectives and the learning process based on the ID model for ISCL. 24 teachers took part in the study.

Instructional Design Model for ISCL

Framework Model for ISCL

The theoretical framework of ISCL is based on an analysis of teachers' curriculum design and the communication process among pupils. From a theoretical view point, "learning by

expanding” which Engestrom (1987) developed by building on Vygotsky (1978) and Leontev's (1981) “activity theory” is the basis of this framework. Jonassen (2000) discussed the method of designing student-centered learning environments based on activity theory. Blanton, et al. (1998) reviewed activity theory as a robust tool for applying telecommunication to teacher preparation. The instructional design model for ISCL focused on activities and learning environments based on activity theory. To illustrate the instructional design model for ISCL, a framework model and a procedure model were developed (Inagaki, 2005a). Reigeluth (1999) distinguishes between an ID model and an ID process model. The framework model is equivalent to the ID model and the procedure model corresponds to the ID process model. In Inagaki (2005b), this ID model was approved by ISCL-experienced teachers. The following image and table show a detailed and refined version of the model.

The framework model for ISCL includes components and structure to practice ISCL. (Figure 1) The fundamental structure of this model is Layer of Activity. The communication, community and collaboration layer provides a point of view to design learning activities. Each component: Reality of Learning, Instructional Objectives and Teacher's Approach corresponds to the layer of activity in a horizontal way. The left side of the model describes the position of the pupils. The right side is from the teachers' perspective. This model is effective for teachers who are trying to design ISCL practice, or have been implementing their plan. They can reflect on their plans and compare them to this framework model.

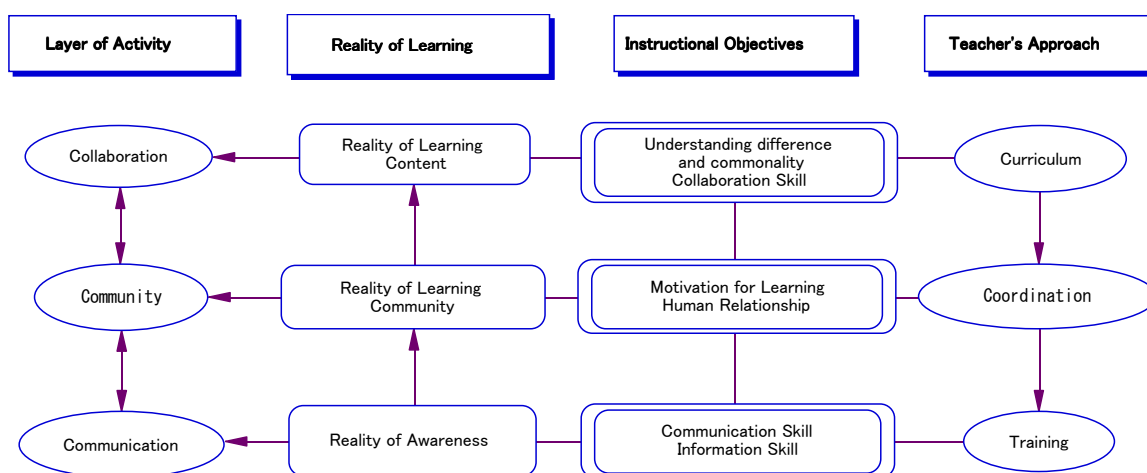


Figure 1. *Framework Model for ISCL*

Procedure Model for ISCL

The procedure model for ISCL provides a more practical solution for teachers designing an ISCL plan than the framework model. There have been several approaches to design a collaboration model for learners. Focusing on how to set a necessity for communication among learners, “The Jigsaw Method” is a representative method in which students work in small groups and individual members of each group join together to perform a task and then rejoin their original groups. This fosters communication (Aronson et al., 1978). For a cross-cultural

situation, Riel (1995) developed “Learning Circles” which provides six phases with goals and tasks encouraging cross-classroom collaboration. These methods have a clear procedure for learners to collaborate. In the procedure model for ISCL, ten steps and one prior condition are included. The ten steps are divided into two phases: “Preparation” and “Practice.” Table 1 shows each step and its applications.

Table 1. *Procedure Model for ISCL*

Phase	Step	Application
Preparation	1: Find partner school, classroom, and teachers	Participate in ISCL projects Contact some teacher he/she knows
	2: Consider theme and materials to collaborate on	Different climate, culture, history, daily life, concern Common problem, activity, products
	3: Arrange communication tools and learning environment	Online tools: e-mail, BBS, video conference Offline tools: postal mail, parcel delivery service, face to face meeting
	4: Design program for the collaboration	Determine activity type: Experience of interaction, exchange of opinions, joint inquiry, collaboration Draw rough units plan
	5: Set instructional objectives into each curriculum	Clarify instructional objectives Link ISCL plan with existing subjects and units
Practice	6: Set first contact and foster fellow feelings	Produce a necessity to encounter distant pupils Bring existence of their partner up in pupils' consciousness
	7: Check communication skill of pupils	Build up pupils' speech skill and expression skill Ensure moral education with regards to information
	8: Regard group coordination and role of each learners	Take advantage of relation size: one for one, group for group, classroom for classroom Give a role for every pupil
	9: Bring interaction into adding quality of investigation	Compare the difference of idea, situation, and attitude of pupils Find commonality and discuss its reason among pupils
	10: Reflect and forecast	Reflect on the history of their collaboration by mutual evaluation Confirm and adjust the purpose of their collaboration and its consequence
Assumption	0: Common understanding among teachers	Share the purpose of ISCL Exchange communication frequently

Purpose

This paper presents an empirical study of how teachers use the instructional design model in actual inter-school collaborative learning practices. Three types of worksheets were developed to enable teachers to practice their inter-school collaboration based on the instructional design model. The purpose of this research is to investigate how the teachers use these worksheets and whether the model and these worksheets help the teachers to practice ISCL sufficiently.

Methodology

To evaluate the instructional design model for ISCL, it must be established that the ID model helps teachers to design their own ISCL practices. To practice ISCL, teachers far from each other have to design their lesson plan together. It should be clear how the ID model supports this design process. Three types of worksheets were developed to help teachers to design their own ISCL plan based on the ID model for ISCL.

The Planning Worksheet supports teachers in designing ISCL with their partner teachers. This worksheet corresponds with steps 1 to 5 in the procedure model as follows.

1. Profile of participant schools: school name, participating grade, number of pupils, name of teacher in charge, geographical, climatic and cultural characteristics of the schools are included.
2. Theme of collaboration: Thinking of the characteristics of the participating schools, a well-suited theme for their collaboration is agreed upon.
3. Condition of pupils and tools: The prior condition of communication tools available for the collaboration, and the pupils' initial communication and information skills are discussed.
4. Lesson plan: A monthly general plan for ISCL, including when the pupils collaborate, when they study independently, and the goal of their collaborative activity is drawn up.
5. Learning objectives: Considering these points above, each participating teacher defines their pupils' learning objectives clearly. Relevant subjects and units are also clarified.

By completing this worksheet with the teacher in their partner school before starting their ISCL unit, the teachers can share and confirm learning objectives and learning processes with each other based on the ID model.

The Reflection Worksheet supports teachers in reflecting on their ongoing plan. This worksheet presents a table including the framework model and the procedure model. The left side of the table shows steps 6 to 10 in the procedure model. However, these steps are not allocated in numerical order. In the right side of the table, three hierarchical layers of the framework model are arranged. Teachers enter their teaching points and methods into the table. This reflection focuses teachers on the ID model and helps them to reflect on their own practices.

The Feedback Worksheet includes a summary of each ISCL practice and evaluation of the ID model as follows.

1. Learning objectives: Pupils' learning objectives which the teachers established and related subjects are included.
2. Records of collaboration: Records of pupils' activities with related steps in the procedure model along with learning objectives, actual events and reflections of the teachers are recorded.
3. Results of pupils' attitude survey: In this project, pupils answered a self-evaluation questionnaire regarding learning objectives of the framework model. This column is teachers' reflections considering the results of the survey.

4. Evaluation methods and results: This column contains evaluation methods and results and issues to evaluate in each learning objective.
5. Achievements and problems: An overall summary of the ISCL plan includes the achievements of the pupils and problems which the teachers experienced when conducting their plan.
6. Contribution and weakness of the ID model: The teachers evaluate the ID model for ISCL.
7. Impression of the project: The teachers finish filling in this worksheet by giving their impression of the whole project.

The 24 teachers were separated into 10 groups of two or three teachers in May, 2005. Each group set its own theme to collaborate on: environmental issues, social studies, food culture, language education and so on. In March 2006, 8 groups successfully finished their collaboration. The other two groups were not able to continue their collaboration because their teacher could not assign enough time to collaborate and did not use the worksheets to make a plan. This paper shows the results from the 8 groups which completed their practice. 10 sets of Planning Worksheets, 7 sets of Reflective Worksheets and 13 sets of Feedback Worksheets were gathered.

In parallel with this evaluation data gathering, the researcher visited the participating schools and helped the teachers to practice their ISCL. In addition, a mailing list including the teachers and the researchers facilitated distant communication among the participating teachers.

Results

Planning Worksheets

Figure 2 is one of the Planning Worksheets. The Planning Worksheet contains 5 columns and each column is linked to the corresponding step, 1 to 5, in the procedure model. All the teachers were able to fill these columns and recognized what was needed before starting their ISCL. The teachers easily built a brief plan and focused on designing ISCL activities with learning objectives in mind.

Table 2 shows learning objectives and planned subjects from the planning worksheets. The objective commonality factor means a percentage of teachers who identified the objective as one of pupils' learning objectives. All teachers set "Cross Culture Understanding" as one of their objectives. "Communication Skill" and "Information Skill" are in joint second place.

The subject commonality factor in Table 3 means the percentage of teachers who used ISCL in each subject. Most of the teachers planned to practice their ISCL in the period of integrated study. Social studies and Japanese language were linked to their ISCL plan.

Reflective Worksheets

With the Reflective Worksheets (Figure 3), the teachers reflected on their own practice with the ID model. There were 88 teaching points in the seven Reflective Worksheets including 29 points in the communication layer, 34 points in the community layer, and 25 points in the collaboration

学校間交流学習をはじめよう！企画書

1. 交換相手を見つける

学校名	学年・交流する児童数	担当教諭	その他(地域・学校の特徴など)
白鹿町立船貝小学校	4年生 39名	竹田洋教諭	山間部に位置し、農業を中心に生活している家庭も多い。食糧・環境に力を入れている。
川西町立犬川小学校			
気仙沼市立鹿折小学校	5年生 32名	熊谷久恵教諭	白鹿町とゆかりのある水産都市気仙沼市にある小学校。気仙沼市では、国内交流事業として夏休みに小学生の代表を白鹿町に派遣している。学区には、海・山・川・町があり、該当学年は、総合的な学習の時間に「環境」「食」をテーマに学習する。

2. 交換の農村・テーマを考えてみましょう

地域・学年・取り組みなどの違い 共同調査・観測・栽培など、比較することで学びが深まる

ゴミ問題・水性 姉妹都市関連 コンピュータ

3. 交換手段を選び環境を整える (ここは学校ごとに分けて書いてください。リクエストもあればどうぞ)

テレビ会議、Web掲示板など使用できるツールと、その使用可能な頻度・タイミング・使用場所

犬小: we b掲示板を使いたいのですが、自治体のサーバが通じないかどうかが問題です。使用場所は、教室とコンピュータ室を考えています。頻度は、今のところ未定です。

犬小: We b学習環境を整えたいです。教室とコンピュータ室を整えたいです。

犬小: タイピング、プレゼン、04 プレゼン、05 コミュニケーションに関する児童・生徒の事前スキル

犬小: 多くの子が、タイピング可能です。プレゼンはまだ、未熟です。コミュニケーションはがんばろうとする子が多くいます。

犬小: タイピング、プレゼンに関してはまだまだです。これから覚えていかなければなりません。なにぶん13名ですので、コミュニケーションも今一歩です。実はコミュニケーションスキルを鍛えるのも交流のねらいの1つになるかなと思っています。

犬小: タイピング能力には個人差あり。達人もいれば、自分の名前程度しかできない子もいる。昨年度末の総合の発表会を見る限り、プレゼン能力は高いとはいえない。水産関係施設の訪問学習の経験は豊富でインタビューは比較的得意だが、子ども同士の交流ははじめてで、期待感が大きいようだ。

4. 交流活動を具体化し計画を立てる

共同調査・観測・栽培、共同制作など、一緒にできる活動は？ 交流のおおまかなスケジュールとゴールを考えましょう

いつ？ どちらが？ どんなことを？

6月 犬小: ゴミ問題の調査を行い、わかったことをまとめます。社会科見学で6月17日(金)に犬小の校区内を通り、ゴミ処理センターへ見学予定。その前後に、調査報告書を送り、夏期にミーティングを持ちたいし、学習を進める予定。3校で、調査報告書で自己紹介や学校紹介をしながら、相手校についてわかったことを中心にポスターやパンフレット、ホームページなどの作品を作る。(夏休み中 気仙沼市代表児童が船貝小を訪問) 犬小: 6月17日(金)に、船小と一緒にゴミ処理センターへの見学に出かける。

8月 犬小: 水生生物調査を行い、川の学習に入る予定。結果を犬小に伝えて、互いの川の様子や水を通じた環境問題について交流予定。(※結果報告程度なら、鹿折川の資料も提示できます。1学期に水生生物調査を行う予定です。)

10月 犬小: さくらんぼの収穫をして、鹿折小学校へ送る予定。報告的な学習で、賞状について取り組むことになっており、これを機会に互いの取り組みの交流予定(異学年交流)

11月 犬小: 理科の学習で一年間まとめたことについて、犬小と意見交換。自然の家で、交流会を行いたい。(焼き芋パーティーを成功させよう等) ※鹿折小からも交流会に合わせて特産品などを送り、仲間意識を高めていきたい。

2、3月 犬小: 鹿折小から交流のメッセージを送りたい。(コミュニケーション能力の高まり・相手意識を持った自己表現力の育成を目指したい)

犬小: 「食に関する学習」で作り上げた作品(パンフレット等)を交流校に送る。1年の交流学習を振り返る。

犬小: 交流校への感謝のメッセージを送る。(できればビデオレターという形をとりたいと考えている。)

5. ねらいを位置づけ明確にする

交流によって育てたい力・気づかせたい事柄を、学校ごとに具体的に書いてください

犬小: コミュニケーション能力の高まり・相手意識を持った自己表現力の育成を目指す

犬小: 同学年の多くの

鹿小: コミュニケーションのよさに気づく

06 教科: 総合の単元のどこに位置づけるのか、学校ごとに具体的に書いてください。

犬小: ゴミ問題について(社会・私たちの環境) 水生生物調査と川の学習(社会・きれいな水とわたしたちの暮らし) 食農学習(総合的な学習)

犬小: ゴミの処理と利用(社会科) 水生生物と川の学習(社会科) 鹿折自由旅行を通して自分たちの住む置間について学習する(総合的な学習)

鹿小: 「環境・食に関する活動(テーマ名未定)」(総合的な学習の時間)等

Figure 2. Planning Worksheet

Table 2. Objective commonality factor

Learning Objectives	Objective commonality factor (%)
Communication Skill	89.5
Information Skill	78.9
Relationship	57.9
Motivation	47.4
Collaboration Skill	26.3
Cross Cultural Understanding	100.0

Table 3. Subjects commonality factor

Subject	Subjects commonality factor (%)
Japanese Language	78.9
Social Studies	52.6
Science	10.5
Period of Integrated Study	89.5

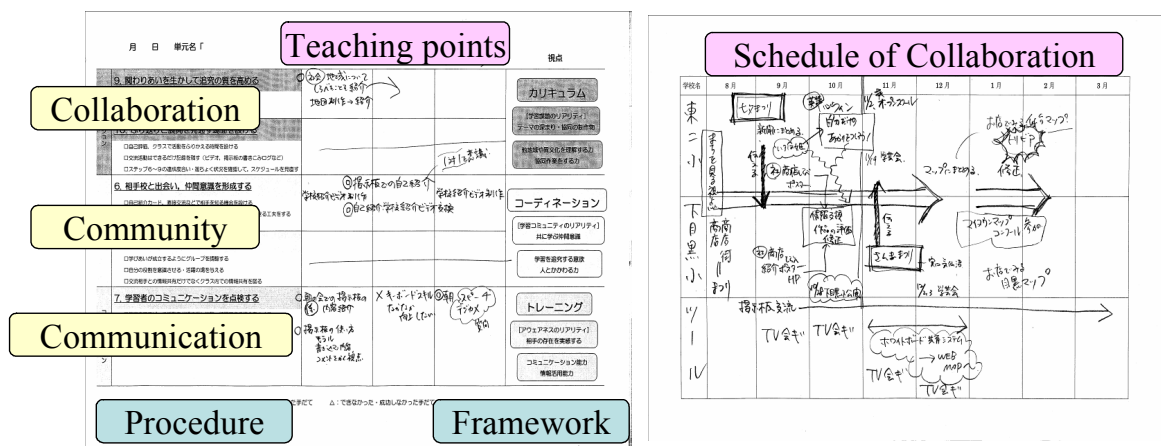


Figure 3. Reflective Worksheet

layer (Table 4.) At this moment, the teachers set many teaching points in the community layer, because their pupils were concentrating on building their fellow feelings with their partner. Especially in the community and communication layers, it became clear how the teachers coordinated and taught their pupils in the lesson plan. It was difficult to think about these layers in detail before the practice. After the reflection, the teachers discussed their plans for the next stage.

Table 4. Teaching points in each group

Layer / Group	A	B	C	D	E	F	H	Total
Collaboration	2	7	2	2	7	0	5	25
Community	4	5	5	4	4	6	6	34
Communication	4	5	3	5	6	3	3	29

Feedback Worksheets

The Feedback Worksheets in Figure 4 were completed by 13 participating teachers at the end of each ISCL unit. The sheet contained implemented learning objectives, record of collaboration, results of the pupils' attitude survey, evaluation methods and results, achievements and problems of their ISCL unit, and contributions and weaknesses of the ID model. Table 5 compares learning objectives and teaching points which were connected to each step in the procedure model. "Relationship," which did not seem to be very significant in Table 2, had the second highest average. On the other hand, "Understanding the difference and the commonality in regional characteristics, culture, and attitudes" showed the lowest average. In practice, the teachers had many methods to foster fellow feelings. However, it was difficult for them to

evaluate cross-cultural understanding. Therefore, they could not set this objective as previously arranged. In fact, the right side of Table 5 showed that the teachers tried to use the teaching points about collaboration. They shifted from fostering fellow feeling to completing the collaboration.

In addition, from the results of the evaluation of the ISCL model, contributions and weaknesses of the ID model were found.

Contribution

- The teachers could imagine ISCL units more easily (n=4)
- The teachers recognized the three layered learning process. (n=5)
- These worksheets were seem to be useful for developing an evaluation criteria.(n=1)

Weakness

- Some teachers needed more time to set face-to-face meetings. (n=2)
- One teacher wanted another worksheet to design a unit more directly based on the framework model .(n=1)

Using the three worksheets based on the ID model helped the teachers to make their ISCL plan with a goal in mind referring to the 10 steps and the stratified framework.

Table 5. *Learning Objectives and Teaching Points*

	Objectives	Avg.	Steps	Total.
Communication	Communication	1.85	6:Communication Skill	27
	Information	1.46		
Community	Relationship	1.77	7:Fellow Feeling	23
	Motivation	1.23	8:Coordination	15
Collaboration	Collaboration	1.31	9:Investigation	30
	Culture	1.23	10:Reflection	20

Findings and discussions

In this paper, 24 teachers were separated into 10 groups and practiced ISCL using the ID model for ISCL. As a result, 8 groups successfully completed their ISCL practice based on the ID model. Three types of worksheets supported the teachers in developing their ISCL plan based on the ID model. There were three findings with regards to how the teachers used the ID model with the worksheets in real situations.

First, the planning worksheets included prior conditions of the pupils and their schools and the teachers' expectation for learning outcomes and pupils' learning process with ISCL. Learning

objectives which the teachers expected to concentrate on were cross cultural understanding, communication skill and information skill. It also suggests that the motivation of the teachers in conducting ISCL is to foster these skills in their pupils, as well as their understanding. In addition, they planned ISCL in the period of integrated study. Social studies and Japanese language were linked to their plan.

Second, the reflection worksheets showed the teaching points of the teachers in the initial stage of their ISCL plan. The teachers set many teaching points in the community layer. It means they thought building pupils' fellow feelings with their partner was important to retain their motivation to communicate. On the other hand, in the community and communication layers, the teaching points were focused on their learning objectives which they stated in the planning worksheets. It suggests that the teachers needed more time to build pupils' community feelings than they had assumed.

Third, in the feedback worksheets, relations between learning objectives which the teachers defined and teaching points were found. It was seen that their focus was shifted from fostering fellow feelings to completing collaboration; however, cross cultural understanding, which was the highest average in the planning worksheets, showed the lowest. Not only the model should support communication and collaborating between schools to complete their collaborative activities, but also understanding of how the pupils deepen their understanding of each other through their collaboration should be supported. In addition, from the evaluation of the ID model, the teachers confirmed the three-layered learning process in the framework model and 10 steps in the procedure model which was implemented in the three types of worksheets supported them in designing their own ISCL plan.

However, not all participants were able to finish their ISCL successfully. In the first stage of planning ISCL, a more detailed image of ISCL activities and more practical methods to unite ISCL and existing subjects and units would help teachers to complete their plan.

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