

# **Online knowledge construction in networked learning communities**

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## **Abstract**

Networked Learning Communities (NLCs) comprise individuals from different schools or organisations collaborating with one another in purposeful and sustained professional development (Jackson & Temperley, 2007). Knowledge construction is central to the work of NLCs as networked learning entails the construction of new knowledge by tapping members' personal practitioner knowledge and the public knowledge base. In Singapore, some NLCs sustain their professional learning through online interactions in collaboration groups within "One Portal All Learners (OPAL)", a learning and content management system developed by the Ministry of Education (MOE). This paper outlines a project that studied knowledge construction within 10 OPAL collaboration groups created by NLCs ("ONLCs"), the roles adopted by the members, and the factors that influenced members' participation in knowledge construction within the ONLCs. According to the Interaction Analysis Model (IAM) by Gunawardena, Lowe, and Anderson (1997), knowledge construction in online collaborative environments progresses over five levels: (a) sharing and comparing of information; (b) discovery and exploration of dissonance or inconsistency among ideas; (c) negotiation of meaning; (d) testing and modification; and (e) application of newly-constructed meaning. Findings revealed that the majority of the online knowledge constructions were at the level of sharing and comparing of information. Six possible factors that influenced members' engagement in knowledge construction in the ONLCs were identified through focus group discussions. The factors identified were (a) a structured approach for enacting NLCs, (b) organisational support, (c) a conducive environment that enables trust to be built among members, (d) shared ownership among members, (e) a culture of sharing that prioritises higher levels of knowledge construction, and (f) OPAL as an enabler. Using findings from the study and from literature, an implementation framework was developed to promote knowledge construction in ONLCs. The implementation framework was field-tested by four NLCs and then refined based on feedback gathered. The feedback gathered on the implementation framework was generally positive and participants found it to be comprehensive, although many felt that the efficacy of the implementation framework to support online knowledge construction may be limited by the affordances of the online collaborative workspace being used. However, the key to raising the level of knowledge construction could lie in nurturing a conducive environment and a culture of sharing, and fostering shared ownership. These three factors can work together to shape the dynamics within the NLC, to help members recognise the importance of co-owning and co-leading the NLC's professional learning.

## **Keywords**

Networked Learning Community, Knowledge Construction, Online Collaborative Environment, Teacher Professional Learning

## Introduction

A review conducted by the Ministry of Education (MOE) of Singapore on the professional development of teachers led to the articulation of a vision for transforming the teaching profession to bring about greater teacher ownership and leadership in Singapore. As a result of the review, one strategy for collaborative professionalism that was proposed is the development of a network of Singapore teachers to foster collaborative inquiry (Cochran-Smith & Lytle, 1993) and networked learning (Jackson & Temperley, 2007) among teachers. With the establishment of the Academy of Singapore Teachers by the MOE in 2010, professional networks were seeded and the notion of networked learning communities (NLCs) was introduced to MOE staff (MOE, 2013). In an NLC, individuals from different schools or organisations collaboratively engage in purposeful and sustained professional development to construct new knowledge by tapping their practitioner knowledge while making use of public knowledge from theory and research (Jackson & Temperley, 2007).

OPAL (One Portal All Learners), a learning and content management system for all MOE staff, was launched in 2012. All MOE staff can set up collaboration groups within OPAL to connect with other colleagues from different schools and headquarter divisions, supporting the development of a culture of continual learning and improvement within NLCs. Some NLCs created OPAL collaboration groups to help sustain their professional learning by supporting asynchronous knowledge construction among members when they are not able to meet face-to-face frequently. Table 1 summarises the types of tools available in OPAL collaboration groups and some possible uses that the tools afforded.

**Table 1: Tools within OPAL collaboration groups and possible uses that the tools afford**

Blog	- Posting of write-up(s) / literature reviews / updates on progress - Sharing of comments and reflections
Chat	- Engagement of members in real-time synchronous conversations - Connection of members for quick exchange
Forum	- Threaded discussions for supporting discussion of ideas and readings - Sharing of multimedia resources and artefacts
Pod/vodcast	- Sharing of audio and video clips
Survey/poll	- Creation of surveys to facilitate NLCs' data collection
Webinar	- Conduct of virtual, synchronous meetings where brief yet critical discussions are needed
Wiki	- Collaborative creation and editing of articles

Numerous studies have studied and highlighted the benefits of NLCs (Cousin & Deepwell, 2005; Day, Hadfield, & Kellow, 2002; Jopling & Spender, 2006; Katz & Earl, 2007; Lieberman, 2000) and the principles that foster successful NLCs (Jackson & Temperley, 2007; Katz & Earl, 2010). However, there has been little research on the use of online/asynchronous collaborative workspaces to support sustained knowledge construction in NLCs. While a search of electronic databases (e.g., Academic Search Complete, Education Research Complete, ERIC, Professional Development Collection) yielded publications related to NLCs comprising teachers, publications pertaining specifically to teachers' knowledge construction in NLCs through online platforms are limited. Research publications on knowledge construction among teachers in online platforms often pertain to higher education and not to in-service teachers in professional learning contexts. This gap in the research was also noted in a study by McGregor, Holmes, and Temperley (2004) that reviewed NLC activities; the authors reported that online tools were rarely used to support collaborative work and professional learning in NLCs.

Despite the promise and proliferation of NLCs, there has been a lack of systematic research about the way they work in educational contexts, or how successful and productive networked learning in education may be fostered (Katz, Earl, & Ben Jaafar, 2009). Specific research on how online platforms support NLCs is even more limited. The lack of empirical research indicates a gap in the theory related to the use of online collaborative workspaces to support knowledge construction within NLCs.

## Purpose

The purpose of this project is to study knowledge construction within OPAL collaboration groups created by NLCs ("ONLCs" for short) so that an implementation framework could be developed as a guide for quality knowledge construction within ONLCs. While NLC members also meet face-to-face, this project focuses only on the online aspect of their NLC work using OPAL. The project was carried out in two phases.

Phase 1 of the project focused on studying the knowledge construction within ONLCs, the roles adopted by the NLC members in these ONLCs, and the factors that influenced the members' participation in knowledge construction within the ONLCs. Participants were selected through purposive sampling from a total of 1889 OPAL collaboration groups that had been created by MOE teachers and officers in 2014. As not all of the OPAL collaboration groups were created by NLCs, the project team used the following criteria to select ONLCs for study: (a) the members within each group were from different schools, in keeping with the definition of NLCs; (b) the groups were created to support the work of ongoing NLCs, and not as part of one-off workshops/seminars; (c) the groups were relatively more active as shown by the number of members who had made posts in their respective forums, the number of posts, and the dates of the most recent posts; (d) different subjects/ foci at different school levels (Primary, Secondary and Junior College) would be represented in the research; and (e) educators of different role profiles (e.g., teachers, key personnel, officers from MOE headquarters) would be represented in the research. Table 2 provides an overview of the 10 ONLCs selected for Phase 1. Participation in the project was invited from members of these 10 ONLCs and a total of 69 representatives from the 10 ONLCs participated in Phase 1 of the project.

**Table 2: Overview of the 10 ONLCs selected for Phase 1**

Group	Key Focus of NLC	Group Members
1	Clarifications of new syllabus	Secondary school teachers
2	Student management practices	Key personnel from secondary schools
3	Student management practices	Key personnel from primary schools
4	Development of middle managers	Middle managers from schools in a cluster
5	Mathematics	Mathematics teachers in a cluster
6	Mathematics	Mathematics teachers
7	Citizenship and character education	Teachers in a zonal special interest group
8	ICT for supporting mathematics learning	Mathematics teachers
9	Humanities subject 1	Teachers of humanities subject 1
10	Humanities subject 2	Teachers of humanities subject 2

Phase 2 of the project focused on using the findings from Phase 1 of the project to develop an implementation framework to promote knowledge construction in ONLCs, and to field-test and refine the implementation framework. The criteria for selecting the NLCs for Phase 2 of the project were that (a) they were newly formed or were at their initial stages as NLCs, (b) they intended to use OPAL collaboration groups to support their work, (c) different subjects/ foci at different school levels (Primary, Secondary and Junior College) would be represented; and (d) educators of different role profiles (e.g., teachers, key personnel, officers from MOE headquarters) would be represented. Four NLCs that met the criteria for selection were invited to field-test the implementation framework. A total of 11 representatives from the four NLCs participated in Phase 2 of the project.

**Table 3: Overview of the four ONLCs selected for Phase 2**

Group	Key Focus of NLC	Group Members
1	Mathematics	Primary school mathematics teachers
2	Social studies	Secondary school social studies teachers
3	Economics	Junior college economics teachers
4	Physical education	Junior college physical education teachers

In both phases, participants were informed that participation in the project is voluntary; participants were free to turn down the invitation to participate in the project or to withdraw from the project at any stage without concern of being penalised.

## Methodology

The research methodology was qualitative in nature with procedures and techniques in line with naturalistic inquiry (Lincoln & Guba, 1987) and drawn from Charmaz's (2000) constructivist grounded theory. The two main types of data collected were interaction data from the participants' ONLCs, and data collected during focus group discussions (FGDs) with the group leaders and members of the ONLCs.

In Phase 1 of the project, the online interactions within the 10 selected ONLCs were studied using the template analysis process (King, 1998). Thematic units were created in the form of paragraphs, sentences or clauses and coded using the Interaction Analysis Model (IAM) by Gunawardena, Lowe, and Anderson (1997). The IAM describes knowledge construction in online collaborative environments as progressing over five levels:

- 1 sharing and comparing of information;
- 2 discovery and exploration of dissonance or inconsistency among ideas;
- 3 negotiation of meaning;
- 4 testing and modification; and
- 5 application of newly-constructed meaning.

The roles adopted by members in ONLCs were studied with reference to patterns of behaviours identified by Thomson, Stuckey, Reeves-Lipscomb, and Mentis (2005) and modelled on Fontaine's (2001) work. The patterns of behaviours with regard to each role are summarised as follows:

- A Thought Leader is one who offers leadership with respect to the domain aspect of the ONLC, and shares a well-seasoned and integrated knowledge of the area.
- A Facilitator is one who offers leadership with respect to the community aspect of the ONLC, and facilitates interaction within the community, building ties between people and knowledge.
- A Mentor is one who offers leadership with respect to the practice aspect of the ONLC and offers support, guidance and assistance to peers from personal experience.
- An Active Participant is one who exhibits behaviours such as simple acknowledge and thanking, sharing of personal information or reflection, sharing of information without elaboration.
- A Legitimate Peripheral Participant is one whose name appears in the list of members within the ONLC but who does not contribute any postings.

The FGDs were characterised by open-ended and semi-structured questions. FGDs were conducted during both phases of the project and every FGD was audio-recorded with participants' consent. The recordings were transcribed, after which open coding and axial coding (Charmaz, 2006) were carried out. To give voice to the FGD participants, in-vivo codes were used as far as possible. The codes generated in the process were used to identify the factors that influenced NLC members' engagement in knowledge construction in their respective ONLCs.

In Phase 2 of the project, an implementation framework was developed based on the findings from Phase 1 of the project and on literature on how learning communities engage in collaborative inquiry. It articulates the theory underpinning NLCs, the factors that affect knowledge construction within NLCs in an online environment such as OPAL, and an implementation cycle with probing questions for the consideration of the facilitators and members of NLCs. In order to evaluate the framework, a field test was carried out to seek feedback from four new NLCs. The NLCs were encouraged to use the framework as a guide for strengthening knowledge construction in the process of carrying out activities that they had planned for their NLCs. Feedback was gathered via email and FGDs. Open and axial coding were carried out for both modes of feedback.

## Findings

Phase 1 of the research revealed that within some NLCs, members and facilitators used tools listed in Table 1, such as the forum, to share and discuss readings, pedagogical strategies, and lesson ideas. Some facilitators encouraged participation by setting timelines for their NLC members to post their views online, while some facilitators left their online activities more open. While there were no consequences to individual NLC members for non-participation, it might affect the overall culture of sharing within the NLC. A study of the interactions within OPAL collaboration groups showed that the majority of the online knowledge constructions were at the level of sharing and comparing of information. Although there was rich sharing of resources and artefacts, and some affirmation of forum posts, there was limited interaction that built on the sharing of resources or that led to higher levels of knowledge construction.

Within the 10 ONLCs studied during the research, close to 89% of the members remained as legitimate peripheral participants (members of the ONLCs but who did not contribute posts to their respective forum spaces). It was also revealed that all the leaders of ONLCs played the role of a facilitator in the online discussions through behaviours such as encouraging interaction of participants, managing social aspects of dialogue, and acknowledging ideas of participants. The leaders also demonstrated behaviours of a thought leader (e.g., citing resources that support the issues being discussed) and an active participant (e.g., posting messages, sharing information, asking questions). The leaders were the most active participants who attempted

to encourage members to participate in online discussions. During FGDs, some members commented that they were more inclined to share in a candid manner when leaders did not set compulsory minimum quota on forum participation and if views expressed were kept confidential and stayed within the ONLCs. Robust relationships and trust between members, built up through meetings in person prior to online discussions, are essential to the creation of a conducive environment that influence members to participate more actively in knowledge construction within OPAL collaboration groups.

Participants revealed that the presence of knowledgeable others tended to make sharing more meaningful in NLCs, as participants valued the constructive feedback provided and suggestions for refinements shared during discussions. However, findings also indicate that helping all NLC members to see that they can be knowledgeable others in their respective areas of strengths may help build a culture of active sharing of knowledge, for the purpose of knowledge construction. Analysis revealed six factors (Table 4) that influenced members' participation in knowledge construction within ONLCs.

**Table 4: Factors supporting members' participation in knowledge construction within ONLCs**

Structured approach	Process guiding an NLC's articulation of its goals, timeline, and course for actions for actualising the goals
Organisational support	Support provided by schools/clusters that enable teachers to be engaged in NLC activities that are beyond school commitments
Conducive environment	One that engenders trust among NLC members such that psychological issues hindering participation in online knowledge construction are minimised
Shared ownership	Sense of a personal stake in the NLC and co-ownership of common goals that enable members to find value and purpose in engaging in online knowledge construction
Culture of sharing	One in which NLC members actively engage in collegial conversations that promote higher levels of knowledge construction
OPAL as an enabler	The design of NLC activities that take into consideration the affordances of the tools in OPAL (i.e., the online collaborative workspace used)

In Phase 2 of the project, the development of the implementation framework took into consideration the findings from Phase 1 of the project, and descriptions in literature of cycles or phases of activity within NLCs. Fox, Haddock, and Smith (2007) described NLCs as having “cycles of opportunities” (p. 303) when moving from birth to youth to maturity. According to de Laat (2006), there are different phases in networked learning activities and some processes can have “different dynamics at various stages of the collaborative work” (p. 119). He described the life cycle of networked learning communities as going through phases of sowing, cultivating and harvesting (de Laat, 2012). As a structured approach is a factor that supports participation in knowledge construction within NLCs, the implementation framework outlines the work of NLCs as stages in an iterative cycle. Within the iterative cycle, the implementation framework highlights possible uses of tools in OPAL collaboration groups. The stages in the iterative cycle and possible uses of tools within OPAL collaboration groups to support the work in each stage are as follows:

- Getting started: Identification of areas of concern and purposes of setting up of an ONLC;
- Forming the ONLC: Invitation of other peers/collaborators and identification of knowledgeable others into the ONLC;
- Identifying goals: Discussion of areas of interest, and literature scan;
- Planning the course of action: Determination of the timeline and milestones in group calendar tool;
- Implementing and reviewing the course of action: collection and analysis of data, and discussion of findings through the forum and webinar tools; and
- Reflecting, affirming and celebrating: Sharing of individual reflections and learning points using the blog tool, celebration to mark the NLC's milestone, and sharing of the learning with the fraternity beyond the NLC.

Feedback on the usefulness of the framework was gathered from both leaders and members of the NLCs that field-tested the framework. Participants felt that the framework was able to provide clarity on what could be done in ONLCs to support the ongoing work of the NLCs. Some participants shared that an understanding of the tools and functions within OPAL could provide NLCs with a convenient and flexible platform to meet and discuss without the need to physically meet. Some participants also highlighted the need for online collaborative workspaces used for supporting sustained knowledge construction in NLCs to be highly

accessible. The feedback gathered was generally positive and suggested that participants found the implementation framework to be comprehensive and useful. One of the leaders pointed out that the framework "covers all the various aspects from conception all the way to reflection and... guiding questions that get the facilitators who run the NLC to be thinking about the most important aspect at each stage".

The implementation framework was refined based on feedback gathered during the field test. The role of all NLC members in co-owning and co-leading online discussions has been made more explicit in response to the feedback shared by some of the NLC members. As shared ownership is an important factor for engaging all NLC members in knowledge construction, parts of the implementation framework were reworded so that it will not be seen as a document that is applicable only to leaders of NLCs, but as one that both leaders and members can use to raise the level of online knowledge construction. Certain sections in the implementation framework were also reorganised to give more prominence to important considerations underlying each stage of the cycle to foreground the habits of mind when engaging in knowledge construction in NLCs, and to avoid as far as possible, the notion that knowledge construction in NLCs is merely a matter of following certain prescribed steps.

## Discussion and Conclusions

A challenge that many NLCs face when carrying out their work in OPAL collaboration groups is to progress beyond the first level of sharing and comparing of information to higher levels of knowledge construction that support collaborative inquiry aimed at effecting purposeful change and improving context-specific classroom practices. The quality of the meaning negotiation is shaped by factors that affect members' participation in knowledge construction within their OPAL collaboration groups, such as whether there is: (a) a structured approach for enacting NLCs, (b) organisational support, (c) a conducive environment that builds trust among members, (d) shared ownership among members, (e) a culture of sharing that prioritises higher levels of knowledge construction, and (f) use of OPAL as an enabler. These factors are in line with key features of successful NLCs, as highlighted by Katz and Earl (2010): accountability, capacity building and support, collaboration, enquiry, leadership, purpose and focus, relationships.

The six factors were infused into an implementation framework, designed based on findings from the research and informed by literature, to promote knowledge construction within OPAL collaboration groups set up by NLCs. The implementation framework includes an iterative cycle, with guiding questions and possible concrete actions that all NLC members could use. While the participants in the field test of the implementation framework generally found it to be a comprehensive framework, they were of the view that the efficacy of the implementation framework may be limited by the affordances of the online collaborative workspace being used. Some participants favoured a workspace that supports immediate and convenient interactions among members. With the current trend of technology capabilities and use, this is not likely to remain as an issue in the medium to long term. Notwithstanding the design and affordances of the online collaborative workspace being used to support knowledge construction among NLC members, other factors such as a culture of sharing, a conducive environment, shared ownership, organisational support, and a structured approach may be just as important, if not more important, for deliberate and collaborative knowledge construction to take place. The members of an NLC can consider how the factors pertaining to a conducive environment, shared ownership, and a culture of sharing can work together to shape the dynamics within the NLC. By establishing a conducive environment built on trust and rapport, and having a sense of shared ownership of the common goals articulated by the NLC, a culture of sharing among the members can be built that encourages collegial conversations that promote higher levels of knowledge construction. In such an environment, all members within the NLC can take turns to lead in the discussion of issues which they are more "knowledgeable" about as each member is a "knowledgeable other" in his/her own right especially when there are diverse strengths and experiences within the NLC. When taking turns to lead in the discussion of issues, members may make use of peer facilitation techniques such as encouraging, inviting and acknowledging contributions, asking questions and sharing alternative viewpoints, and summarising and synthesising (Ng, Cheung & Hew, 2009, 2012), as well as strategies for steering discussions to elicit the distributed knowledge among fellow NLC members by making connections among members' contributions and helping one another to move toward other considerations with a deeper perspective in mind (Feger & Zibit, 2005). Such an approach may help members see that a knowledgeable other is not necessarily an expert who is external to the NLC, but that each and every member can be one another's knowledgeable other and can play an important part in co-owning and co-leading the community's professional learning.

Future research could explore NLCs' use of other types of online collaborative workspaces, with the implementation framework being adapted to be used with other online collaborative workspaces. It may also be of interest to study how online interactions among NLC members feed into their face-to-face interactions, and vice versa, and how the translation between these different modes of interactions could be tapped to sustain and enhance ongoing knowledge construction within an NLC.

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