Learning Design as a Medium for Scaffolding Teacher Learning and Collaboration

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Abstract: Teachers implementing new curricula targeting the development of 21st century skills face the challenge of learning how to design learning experiences that align with the intended pedagogical approach. Curriculum reform initiatives expect that development will take place at least in part through teacher collaboration and sharing of curriculum resources through digital repositories. However, curriculum artifacts have not so far proved to be an effective medium for teacher collaboration. This paper argues that the teaching profession suffers from not having a shared professional language to describe and communicate their design ideas, and demonstrates that the provision of a design language and format that highlights the multilevel, multi-faceted aspects of a design helps to scaffold teacher discourse to deeper pedagogical discussions. On the basis of the findings from a cross-cultural collaboration, we set out the implications for computer-supported collaborative learning for teachers, to enable more effective teacher learning and collaboration.

Introduction

There have been increasing pressures from businesses and governments to move education from a focus on competence in specific knowledge and skills to developing students' information literacy, problem solving, collaboration and communication skills—abilities that are generally referred to as 21st century skills (Partnership for 21st Century Skills, 2003.; UNESCO, 2008). The demand is for education to produce graduates who are capable of knowledge creation and innovation, which requires changes in the goals, curricula and processes of schooling (e.g. Kozma, 2008; UNESCO, 2008; CERI, 2001). In response to such pressures, education policy documents in many countries show a strong orientation towards more student centered modes of learning and pedagogies that encourage students' active engagement in collaborative inquiry and the use of ICT to support collaboration and inquiry (Pelgrum & Law, 2003; Plomp, Anderson, Law & Quale, 2009). These changes can only be realized through deep changes in teachers' knowledge, beliefs and practice. It is thus not surprising that many major curriculum reform initiatives are accompanied by significant investment to provide support for teacher learning and curriculum development, as well as teacher collaboration and sharing of curriculum resources through digital repositories.

In Hong Kong (and possibly in many other countries), curriculum and professional development projects are expected to deliver, as an important outcome, curriculum artifacts generated by teachers and/or researchers that can be used by other teachers in implementing new curriculum and pedagogy. Hence curriculum resources act as a kind of defacto medium for teacher collaboration and professional learning. On the other hand, it has been observed that the adoption of open education resources is much lower than the amount of materials that have been shared (1). So we have a somewhat contradictory observation that teachers complain about lack of suitable resources for implementing new goals and approaches in the school curriculum, while curriculum resources specifically designed for teachers, including those by teachers, are not being adopted. Furthermore, even in cases where the curriculum artifacts are adopted by another teacher, it is often the case that the use is different from how it was initially intended or designed for in the first instance (Laurillard and McAndrew 2003). Thus, curriculum artifacts have not proved to be an effective medium for teacher sharing, nor have they been an effective medium for communicating pedagogy.

The biggest challenge to teachers in implementing new curricula targeting the development of 21st century skills is in learning how to design learning experiences that align with the intended pedagogical approach. There are three different aspects of curriculum design on which teachers typically collaborate: theories about learning and pedagogy, teaching and learning activities, and resources for teaching and learning. While these types of teacher interactions are useful and important, they are not sufficient for negotiating the full complexity of the learning design process. To ensure that learners are provided with learning opportunities to achieve the targeted outcomes, teachers have to engage in design work at several different but interconnected levels: the curriculum unit (or module), the sessions (or lessons) comprising the unit, teaching and learning activities before, during and after a session, and the resources and tools to be used within a session. At each of the design levels, the teacher has to give due consideration to the learning goals (content, skills and/or attitude), pedagogical approach to be adopted, the nature of the student engagement needed, what student-generated content needs to be specified, the rubric or criteria for assessment, and the kind of feedback that will be

provided to the learner. In addition, the teacher needs to ensure that the different levels and facets of the design are properly aligned to provide a coherent set of appropriate learning experiences (Biggs 2003).

In this paper, we put forward the view that the teaching profession suffers from not having a shared professional language to adequately describe and communicate these design issues and decisions, and demonstrate that the provision of a design language and format that highlights the multilevel, multi-faceted aspects of a design helps to scaffold teacher discourse to deeper pedagogical discussions. We will also discuss, on the basis of the findings, implications for the design of technology support for learning design that will be able to support more effective teacher learning and collaboration.

Context of the Study

The present study is conducted in the context of a university-school partnership project, titled Learning 2.0 (2), which aims to design a curriculum and assessment platform to be used to support the teaching of Liberal Studies, a new, compulsory subject in the Hong Kong New Senior Secondary School Curriculum launched in September 2009 (CDC & HKEAA, 2007). This subject was introduced by the Education Bureau to address the issue of an over-emphasis on rote-learning. The subject focuses on fostering students' lifelong learning and inquiry skills. The curriculum specifies a number of key concepts such as social mobility, quality of life and globalization in the humanities, science and technology areas for students to develop a reasonable understanding through exploring issues emerging from contemporary and current themes and problems. There is no a set textbook or content specification, but the curriculum specifies *issue-enquiry* as the pedagogical approach of choice that teachers should adopt in teaching this subject. Furthermore, teachers are expected to play the role of curriculum and assessment designers to develop modules to implement this issue-enquiry approach for the achievement of the curriculum goals for this subject.

The *Liberal Studies Curriculum and Assessment Guide* (CDC & HKEAA, 2007, to be referred to as the C&A Guide) recommended some design principles on implementing the curriculum, with implications for how issue-enquiry modules should be designed. First of all, these modules should provide contexts for students to learn to integrate, apply, consolidate and broaden their foundational knowledge through engaging in in-depth inquiry and reflection on contemporary issues connected with the selected contexts. Students should be exposed to perspectives and concepts essential to the understanding of issues of human concern, and develop their independent and lifelong learning skills, values and attitudes, which could be transferred and applied to the understanding of new issues and contexts. According to the C&A Guide, each module should be organized around a central concept within one of three areas of study specified in the curriculum (e.g. Society and Culture). Each module should identify questions for inquiry related to key themes (e.g. quality of life, rule of law and socio-political participation) relevant to students' lives, and embody perennial issues (i.e. issues involving values that are important to students and society and underpinned much of the debates and conflicts surrounding the problem context).

The Learning 2.0 project is funded by the Hong Kong Quality Education Fund. An important component of the project is to develop a Moodle-based (3) online learning and assessment platform (iLAP) (4) that teachers can use to create online course-rooms for their students as an integral part of the teaching and learning activities in the Liberal Studies subject. Participating project schools identify key teachers to contribute to the design and development of iLAP, as well as the design, implementation and evaluation of the inquiry enquiry modules on this platform. Teachers involved in this project hold weekly meetings to discuss and share module ideas and designs (all meetings are audio-recorded, and are used for the analysis reported in this paper). They are also able to visit each other's actual course websites (referred to as course-rooms in the project) on the iLAP platform. The iLAP platform enables the teachers in this project to collaborate and share the full richness of their teaching designs in terms of activities and resources used as well as review the student-generated work in these course-rooms.

Nature of Teacher Discourse on Designs Presented in the iLAP Course-rooms

Teachers in the network hold weekly project meetings and one of the regular items on the agenda is to share design ideas and implementation experiences on the curriculum modules they have set up on iLAP. The teachers are generally very interested in sharing their work and discussing ways of improvement. On the other hand, the discussions were at a level that made it difficult to move the designs forward at a deeper pedagogical level. To give some concrete illustration of the focus of the discussions, the following is a list of the issues/suggestions raised in one of the teacher meetings on two of the modules designed and implemented by teachers in two different project schools in June and July of 2010 (these two modules will also be the focus of our further exploration on ways to enhance teacher sharing and collaboration later in this paper):

1. Recommend the use of the forum function in "group discussion" activities, as this will allow the discussion to be commented on and assessed by peers and by the teacher using the built-in assessment function.
2. Suggest getting students to work on the Wiki for consolidating what they have learnt through the module. The availability of the history function in Wiki will allow teachers to track students' contributions.

3. Suggest the use of Mahara on the iLAP platform for students to build a module folder
4. It may be better to provide every student with his or her own individual Wiki page.
5. The self-reflection tasks may be better done on paper.
6. Which will be better for student learning: online forum v.s. a face-to-face debate?
7. One teacher shared a generic rubric on critical thinking and suggested providing such for students' reference as an implementation of the "assessment for learning" idea.
8. Suggest getting students to answer questions from the C&A Guide as a after-lesson consolidation
9. Students in some schools may not have the motivation to participate in collaborating on the wiki or in self-reflection activity
10. The allocation of two weeks for the module limits the extent to which relevant iLAP tools/activities can be integrated into the module

It can be seen from the above list that the teachers were very engaged in sharing and discussing pedagogical design during these meetings, particularly in relation to the effectiveness of using different technological tools for specific learning activities (points 1 to 6 of the above list). Points 7 and 8 were related to assessment and learning activity design to enhance students' learning that could be applicable for the subject in general. Point 9 was about the match between the motivation (and ability) of students and a specific type of online activity. All these discussions were valuable, but were pitched at a very general level. Only point 10 was about the specific feature of the particular module under discussion. Moreover, none of these discussions were specific to designing issue-enquiry pedagogy as specified by the C&A Guide.

Comparing Learning Designs as Communicated through Artifacts in an Online Course-room

The project research team was somewhat disappointed about the lack of more holistic discussions about module level pedagogical design for issue-enquiry. In addition, the foci of the teachers' discussions for both of these modules were very similar despite important pedagogical differences between them as perceived by the research team. Further explorations reveal that the activity structures of these two modules were very similar as can be seen from Table 1, which presents a summary of the information available in the two respective course-rooms. Both identify a conceptual focus and generic inquiry skills as the learning goals and a current affair issue as the context for students' exploration. Both started with using media materials (videos from TV broadcasts and newspaper clips) to introduce the issue context and to stimulate student discussion. This was followed by group discussions guided by a worksheet for a focal student activity in the module—a role-play in Module A and a debate in Module B. Students were provided with a structured wiki to continue their group preparation at home. Finally, after the focal activity, students were asked to complete a reflection activity. The total class contact time was the same—five 35-minute periods. Module A has a double period in session 4. Sessions 2 and 3 in module B were double periods. Upon detailed inspection, there are differences at the level of specific activities such as the nature of the reflection task. It is apparent that these are the critical differences at the specific activity level that constituted each teacher's focus of attention on these designs.

The Structure of a Pedagogical Pattern

It can be argued that what is being presented in the online course-rooms are not adequate representations of teachers' curricular designs. The challenge to us is—what would be an adequate representation? We need a common format that is capable of revealing the similarities and critical differences in teachers' pedagogic designs.

A research project in the UK is developing a prototype for a 'learning design support environment for lecturers' (LDSE) (5) with the explicit intention of having an impact on teachers' practice in designing technology enhanced learning (TEL) by giving them the means to represent and share their design ideas. . In this study, the two projects are collaborating to test the extent to which the prototype meets the requirements of teachers who need help with making good use of technology, and whether it succeeds in promoting deeper pedagogical discussions and more collaborations in pedagogical design.

The requirements for a design pattern of any kind are that it must have a context, problem to be solved, and a way of solving the problem (Goodyear 2005). For a pattern that captures a good pedagogic design, the context is formal education, the problem is the learning outcome to be achieved, and the solution is the sequence of teaching-learning activities that have been found to succeed in that. Representing pedagogy succinctly and intelligibly is not easy. The current formats for representing learning design cover several parameters relevant to the teaching context, such as rationale, roles, group size, etc., but they disguise the complexity of the pedagogy by placing it in a single category such as 'sequence of activities' (Laurillard and Ljubojevic, in press). Alternatively, the narrative account of the learning design (6) is detailed, but difficult to generalize and customize to one's own context. The pedagogical pattern format that can scaffold productive pedagogical discussions, professional collaboration and development has to unpack the sequence of teaching and learning activities to expose the crucial features that makes a pedagogy work.

Table 1: A comparison of two issue-enquiry modules as communicated through the iLAP online course room.

	Module A	Module B
Module title	Fine-tuning of medium of instruction (MOI) policy in Hong Kong	Understanding post-'80s youth through the high-speed rail conflict
Learning goals	Understand the concept "quality of life" and learn generic skills of inquiry	Understand the concept "political participation" and learn generic skills of inquiry
Module context	The change in language policy by the Education Bureau in Hong Kong	Post-80s youth staging high profile demonstrations against the construction of high-speed rail through a remote village
Module level resources	Teacher generated handout containing definitions of key concepts, and list of key policy changes related to context	A group wiki on concepts for students to write down and share the most appropriate definitions of key concepts
Session 1	• Video 1—an interview (for teacher presentation) • Group wiki/worksheet 1 on video 1 (for use in groups discussion) • Video 2—an interview (for teacher presentation) • Student worksheet 2 on video 2(for individual work in class)	• Pre-session preparation—online discussion forum for students to discuss issues related to the context and to summarizes key views found in discussion in a group wiki • Handout 1 containing newspaper clips on context—teacher presentation • Supervised group discussion to complete group wiki/worksheet • Video 1—a televised public debate—teacher presentation • Supervised group discussion to complete group wiki/worksheet • Post-session review—students read Handout 2 with more newspaper clips and complete online quiz
Session 2	• Video 3—a TV feature on the policy change (for teacher presentation) • Student worksheet 3 on video 3 (for individual work in class) • Political cartoon (for teacher presentation) • Group wiki/worksheet 4 (for use in groups discussion)	• Pre-session preparation—students read Handout 3 (newspaper article by one post-80s activist) • Supervised group discussion to prepare for role play using group wiki/worksheet
Session 3	• Group wiki/worksheet 5 (used in group discussions to prepare for role play) • Four sets of newspaper clips – one for each stakeholder in the role play • Self-evaluation rubric for students to assess their own preparation	• Debate • Group concept mapping as a part of debriefing consolidation
Session 4	• Role-play • Evaluation rubric for assessing role-play • Student to submit reflection essay (online)	

Our current template for a 'pedagogical pattern' consists in the following categories of description:

- Title – to capture the point of interest;
- Learning outcome – to help the teacher decide if it is likely to fit their need;
- Summary – similar to a brief abstract;
- Sequence of teaching and learning activities (TLA) with the time needed for each – time on task is a critical aspect of pedagogic value;
- The category of TLA each one falls into – to assist analysis and comparison;
- A description of each TLA that reflects the core focus and critical aspect in implementation
- The assessment used to evaluate learner attainment
- Tools and resources needed – to promote the sharing of these across patterns, and to enhance them by embedding them in a pedagogical pattern
- The designer's reflections – to promote reflective use and revision of the pattern

A pedagogical pattern is developed initially from a specific instance, as that is where the effort of design is to be found, where a teacher is intent upon achieving the best outcome for the learners they know, in the topic they know. Once the teaching idea is articulated in a formal pattern description it is often easier for the teacher to see what is missing or what could be improved, so this can be a useful exercise in its own right. An example is given in Figure 1, using a pattern derived originally from the iCOPER project (7). This was developed for an initial teacher-training context, represented by the content details defined at the top: *classroom teaching, photographing key situations*, and *children's engagement*. Each of the content items is colored differently to highlight specific aspects important to the particular instance of the design. For example the pattern in Figure 1 can be replaced with new content items, e.g. *dental surgery, video recording*, and *patient care*, to adapt the pattern to a quite different professional development field (8). The essence of the pedagogy is captured in the unchanging text, making it possible for good teaching ideas to be shared more easily across discipline boundaries. The colored text in the activity sequence in Figure 1 indicates how the specific curriculum aspects of the design are taken care of in the TLA sequence. The task for our collaborative project is to test whether this approach works for teachers in schools, and whether they can use it to enhance the process of exchanging ideas on pedagogic design.

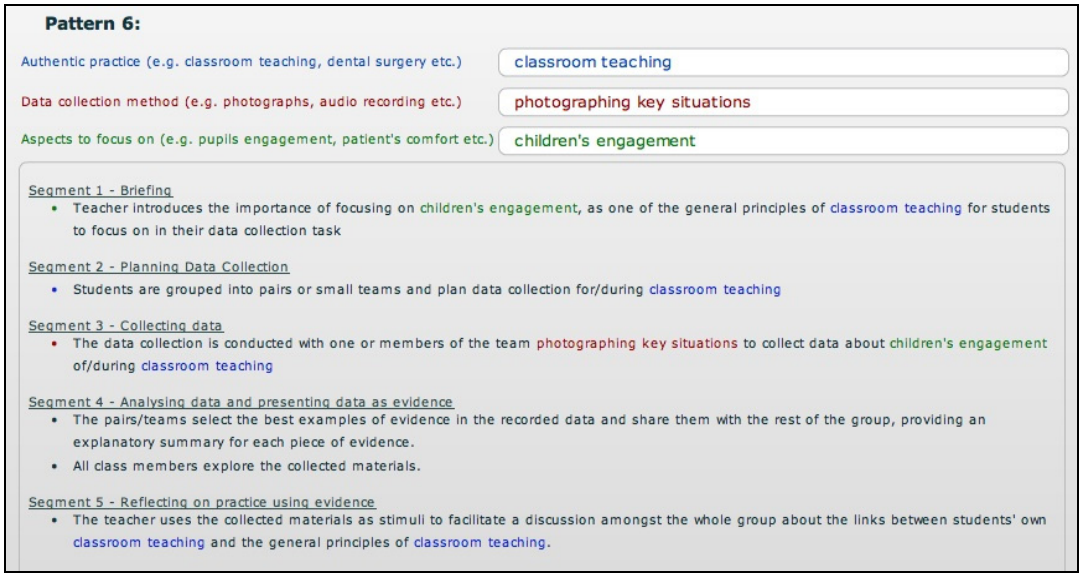

Figure 1. A 'Pedagogical Pattern' Instantiated with the User's Content for an Initial Teacher-training Course.

Comparing Learning Designs Represented on a Design Template

A preliminary pedagogical pattern was constructed to capture the essence of the features and pedagogical decisions in the design of issue-enquiry modules for the present study. We identified five critical elements in the pedagogical pattern—conceptual learning outcomes targeted (e.g. quality of life, political participation), generic skills and attitude outcomes targeted (e.g. able to identify key points of debate, be open and listen to different opinions), the issue context for the module (e.g. the Fine-tuning of the MOI policy in Hong Kong, construction of the high-speed rail through a remote village), teacher-provided content (e.g. news media, assessment rubrics), and student-generated content (e.g. wiki, online forum). Figure 2 presents a design template we developed for use in this study to represent the designs for Modules A and B described above.

The pedagogical patterns as constructed using this template highlighted important differences between the two modules. For Module A, there was no activity that explicitly addresses the conceptual learning outcomes; generic skills was addressed through the assessment rubrics, focusing on students' presentation and communication skills); and most of the activities were centered around the specific context—the impact of the policy change on different stakeholders. For Module B, we see a gradually changing focus of the activities from the specific context (construction of high-speed rail) to identification of the focus of the debate to linking the debate to some key concepts related to political participation. There is a strong focus on developing students' conceptual understanding through teacher-led discussions as well as the tasks designed for group discussion and unsupervised individual student work.

Effect of Learning Design Representation on Teachers' Professional Discourse

In September 2010, six new schools joined the project as a second phase to scale up the innovation. Modules A and B were presented to all of the participating teachers, most of whom are new to the project. In addition to the

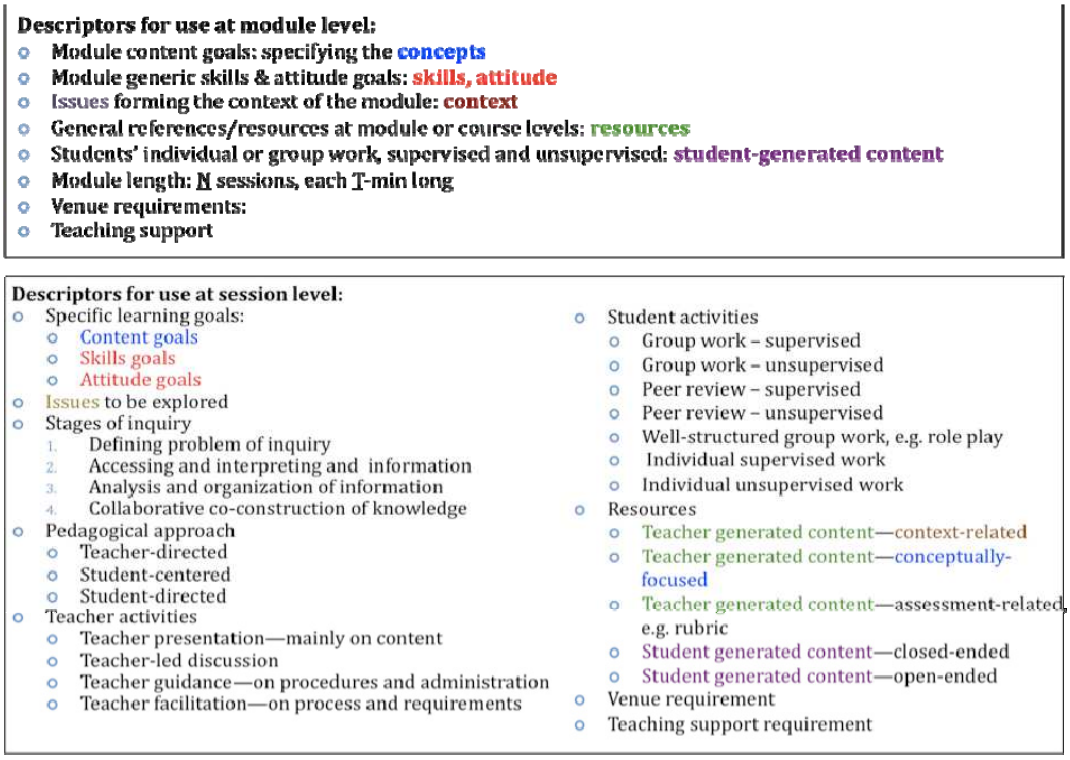

Figure 2. A Design Template Used for Generating the Pedagogical Patterns for Modules A and B.

iLAP course room, the teachers were presented with the pedagogical patterns for the two modules and asked to provide comments. From the pedagogical patterns, the teachers very quickly identified the difference in the nature of the content focus for the two modules. A very lively discussion ensued that covered issues not observed in previous discussions. The key issues raised by the teachers include:

1. Module A could be improved through more appropriate consolidation activities such as asking students to write a short essay that explicitly reflect on the link between the MOI policy with the key concepts related to quality of life that the module wants to target.
2. Students [in module A] should be guided to demonstrate their understanding of the targeted concepts through their discussions on the contextual issues.
3. Module B is able to achieve a better alignment with the key conceptual outcomes targeted as students were guided to identify the conceptual issues underpinning the conflicts rather than simply identifying the view points on the contextual issues [as in Module A].
4. Module B has a context/scenario-based design in that students are introduced to the context and issues before the content. This design is better as students will first develop a stronger empathy with the contextual issues, making the students feel that the conceptual issues are relevant to their everyday life.
5. Opposing viewpoint to the above was also expressed—Module A adopts a deductive approach of introducing the concepts before the context, which could be clearer and more explicit for students to follow, and is hence preferable to the inductive approach of first introducing the context.
6. Some teachers think that both inductive and deductive approaches could work, but it is important for the teacher to be fully aware and be explicit about the approach that is being adopted.
7. The current issues selected as the context of enquiry should not be the focus of enquiry in a Liberal Studies module—it only serves the purpose of stimulating explorations of the targeted conceptual outcomes.
8. Current issues easily become outdated and lose their relevance. There should be continuity from one module to the next—we should find ways to check and ensure that students are able to apply the concepts learnt in one module to the analysis of issues in another, different context. This is the core design idea of the Liberal Studies curriculum.
9. There is no need to address every relevant concept, skill and attitude in one lesson or in a single module. Sometimes it may be better if the teachers just focus on one focal learning outcome in one lesson.
10. Teachers should pay close attention to the questions in the C&A Guide in designing learning tasks such as student discussions to ensure a better alignment with the targeted learning goals.

There are two prominent features in this discourse. First of all, there is a strong focus on the alignment between the targeted learning outcomes and the design at individual TLA and module levels. Secondly, the discourse encompasses design considerations at activity, module and curriculum levels. Points 1 to 3 focus on

how the alignment could be improved through changes in the selection or implementation of individual learning activities. Points 4 to 6 concern the sequencing of activities and the implicit pedagogical model underpinning them, which is a module level design issue. Point 7 addresses a core design concern in issue-enquiry pedagogy—the role of context in a module. Point 8 goes beyond a single module to discuss the connection between modules within the context of the whole curriculum. Point 9 is a design concept that could be applied to the whole curriculum and point 10 refers explicitly to how the C&A Guide could be used in the process of module design. This discourse is clearly much richer in terms of pedagogical design considerations compared to the discussions on the same modules when the pedagogical patterns were not available. This is an indication that an appropriately structured learning design representation can potentially make a difference to teachers' learning and collaboration discourse in pedagogical design.

We were also interested in teachers' views of the usefulness of the pedagogical pattern template in supporting teacher sharing and collaboration. Interestingly, the response was less than positive. The general feedback is that the template is not user-friendly, and the many colors (actually five was used, as presented in Figure 2) in the text were somewhat overwhelming. The teachers were particularly concerned and reluctant to use the template for presenting their design. On the other hand, some teachers commended the clear list of important module descriptors that has to be clearly spelt out at the start of each module pedagogical pattern (the colored text in the top box in Figure 2 are placeholders, which are replaced by specific content in actual module patterns such as the patterns for Modules A and B presented to the teachers). The teachers also liked the clear specification of the learning outcomes targeted for each TLA listed in the sessions. One teacher proposed using a tabular format for listing the sequence of TLA and a separate column be created to identify the conceptual focus for each listed TLA. One teacher also suggested that a table containing all the concepts and generic skills listed in the C&A Guide should be made readily available for consultation by teachers when they work in iLAP to construct the module course-rooms.

Discussion

The work we have reported here is just a preliminary exploration of whether and in what ways a pedagogical pattern template may support deeper levels of sharing and collaboration on pedagogical design among teachers. It is clear from the teachers' responses that the preliminary pattern template for issue-enquiry modules we have constructed is far from perfect. On the other hand, the depth and richness reached by discourse is impressive, considering the very preliminary nature of this exploration. This work reveals the need for learning design support environments to scaffold teacher learning and collaboration if they are to take on more of the role of a learning design professional and less as an instructor.

Learning Design as a High-level Professional Activity

Learning design is a complex professional activity, which is multi-level and multi-faceted, as represented in Figure 3. There are design considerations to be deliberated at many levels—from entire curriculum, module, session, activity, to learning resource and technological tool to be used (if applicable). The design at each level need to take account of a number of facets: the learning goals to be achieved, the pedagogical approach to be adopted, nature of the student engagement, the kind of student-generated content to be elicited, the criteria for assessment (and rubrics to be used if applicable), and the kind of feedback that needs to be provided to students. These different facets need to be well orchestrated to achieve the design requirements at each level. These different levels of design need to be consistent and aligned with each other. The teaching profession needs appropriate learning design support environments to rise to the challenge of collaborating to improve pedagogical design.

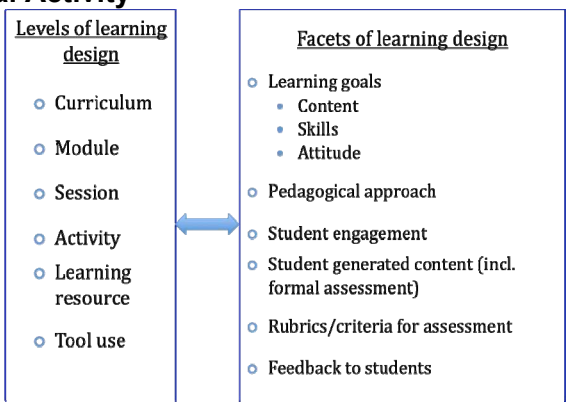

Figure 3. The Levels and Facets of Pedagogical Design.

A recent contribution to the Foresight Report points out that teaching and learning is so complex an enterprise that it needs the seamless integration of all the current forms of interactive, adaptive, informational, virtual, communication, collaborative, and presentational forms of technology currently in use (Laurillard, Kolokitha, Mellar, Selwyn, and Noss 2009). While other design-focused professionals such as architects and engineers have well developed conventions and tools for describing, constructing, sharing and communicating designs, the same is not available for teaching professionals in relation to pedagogical design. This lack of a commonly adopted convention and tools for learning design poses serious obstacles to teacher learning and collaboration, and consequently the speed with which pedagogical advances can be propagated.

Adapting, Testing and Improving Learning Designs

If teachers are to articulate their developing knowledge of effective pedagogy, then they need to be not only able to share and build on each other's work, but also to test it. This happens in the classroom every day, but if there is a viable way of setting a design against theoretical principles for good design, then to some extent its quality can be estimated in advance. A well-developed patterns template should contain all the information needed to do that, because it tells us how learners are spending their time, on what kinds of activities, and how the balance of their time is distributed across the different kinds of learning. The LDSE has an internal representation of the pedagogic type of each activity in the pattern and, using the information about the respective times spent on each activity, can interpret the nature of the whole pedagogical pattern as a pie-chart showing the distribution of the kinds of learning it affords, whether through acquisition, inquiry, discussion, practice, or production, and the distribution of learning outcomes these activities target. Building on the outcomes of the present study and the patterns and design support tools that the LDSE project has developed, we hope to construct an issue-enquiry pedagogical patterns support system that Liberal Studies teachers in Hong Kong can use as a kind of microworld for learning design, to enable teachers to design-test-redesign before trying it on their students. And because it also captures their design, they and their students can annotate it retrospectively, improve it, and then publish and share it with their peers. In this way we hope to *appropriate technology to scaffold professional collaboration and sharing in learning design*. A learning design support environment of this kind would offer a specialized tool for teachers of a kind they have never had, that exploits the capabilities of the technology to represent their decisions, interpret them and visualise the feedback. By representing the full complexity of what teachers do, in a way that remains close to their practice, and yet also challenges it, they become more empowered to develop that practice, in collaboration with their peers.

Endnotes

(1) For a discussion of issues related to low adoption, see http://opencontent.org/blog/
(2) Details can be found at the project website http://learn20.cite.hku.hk
(3) Moodle is an open source Learning Management System (LMS). Details can be found from http://moodle.org/.
(4) iLAP stands for interactive Learning and Assessment Platform. Details can be found from http://learn20.cite.hku.hk/page.php?page=platform
(5) See the project website at http://www.ldse.org.uk for more information.
(6) Learning Designs http://www.learningdesigns.uow.edu.au/
(7) ICOPER http://www.icoper.org/
(8) Available for trial at tinyurl.com/ldsepatterns

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