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Exploring Teachers' Perceptions of Wikis' Affordances in Supporting Their Learning of Classroom Cases

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Abstract: This paper explores three potential affordances (social, technical and pedagogical) of wikis in the context of designing 32 teachers' learning of classroom management cases. Two learning environments were designed and two groups of the teacher-participants posted their own written and audio cases, identified problems, discussed and proposed solutions with the input of their peers, in the respective wikis hosted in Google Sites® and Learning Activity Management System® (LAMS). The teachers' perceptions of the wikis' affordances to support their case-based learning were surveyed quantitatively. The five-point Likert scale survey ranked technical affordance highest, followed by social affordance and pedagogical affordance. Qualitative data from their online discussions and reflection logs were also analyzed to probe the variations in perceived affordances. Participants experienced ease of use and freedom from technical difficulties in achieving their learning goals (interaction with peers and sharing of resources). This paper discusses further work in harnessing wikis' affordances for designing more effective case-based learning environments to cater for diverse learners. It also provides suggestions for further research into wiki pedagogy

Introduction

The use of wikis for learning in higher education is one of the global trends associated with the use of social network sites for connecting individuals and communities. To teach with wikis, instructors typically design wikis, publish and provide access to them for their learners so that the latter can participate in learning activities such as discussion and the sharing of resources during courses. However, the design of an effective technology-enhanced learning environment involves more than simply setting up the virtual learning space. The affordances of wikis and how users perceive these affordances influence the design of the learning environment. Research has highlighted three affordances (pedagogy, social and technology) for designing a useful learning environment (Gaver, 1991; Kirschner, Strijbos, Kreijns, & Beers, 2004; Norman, 1999; Wang, 2008, 2009). **Pedagogical affordance** refers to the characteristics of technology-enhanced learning environments that determine whether and how learning activities can be implemented in a given educational setting for a target group of audience; **social affordance** refers to the properties of the environment that promote social interaction among its users and **technical affordance** to the usability of the environment for learning and task accomplishment. One of the challenges that prospective teachers face is dealing with daily real-life classroom

management issues that require problem-solving skills (Choi & Lee, 2008; Harrington, Quinn-Leering, & Hodson, 1996). Classroom management involves multi-level interactions and human behaviour in the classroom environment (Doyle, 1986, 1990; Evertson, Emmer, & Worsham, 2003; Evertson & Weinstein, 2006; Levin & Nolan, 2007). It is ill-structured in nature (Lee & Choi, 2008). Without an understanding of the heterogeneous and contextually-situated nature of classroom management, prospective teachers who simply acquire a set of mechanical skills from textbooks in teacher education programs, they tend to have difficulties in applying their learning to their actual classroom settings (Choi & Lee, 2008, 2009). To support their solving of real-world problems in the form of cases, researchers developed web-enhanced technologies such as CaseNet and CBL-CMPS (Bronack & Kilbane, 1998; Heitzmann, 2007; Choi & Lee, 2008). With the necessary scaffoldings and learning resources provided for case-based learning in the case-based environment, learners are prompted to articulate justification for improvement in their cases by linking the relevant educational theories with their practices. Furthermore, Kim and Hannafin (2008, 2009) reported that teachers who had learned in such an online case-based learning environment showed gains in expert knowledge because they had been provided with the opportunity to articulate and envision their thinking and plan for real-world teaching. Other studies described how their self-developed and case-based learning environments had helped their students' classroom management skills (Choi & Lee, 2008, 2009; Kim & Hannafin, 2008, 2009; Lee & Choi, 2008). Nevertheless, given the large amount of time, energy and money involved in the design and implementation of a case-based learning environment, it is still not realistic to expect all teacher education programs to follow suit. In this study, we first propose designing case-based learning environments for teachers' learning by using wikis. Guided by the affordance framework (Kirscher et al. 2004) and taking into account our unique context, we adapted the framework for designing the wikis using two Web 2.0 tools. By analyzing the teacher-participants' survey responses and their online reflection logs, we gained an insight into the teachers' perceptions of the affordances of wikis for designing case-based learning environments. We were also able to confirm our proposed affordance classification framework of wikis.

A Proposed Affordance Classification Framework

Given the availability of various ICT tools, the difficulties experienced by instructors and instructional designers in selecting or designing proper ICT tools or learning environment have increased significantly. To tackle this challenge and integrate technology into their daily teaching, instructors need a well-defined framework for affordance analysis to guide them through the process of tool selection and learning environment design. Researchers in the field of learning technology have proposed various categorizing frameworks (e.g., Conn, 1995; Gall & Breeze, 2005; Kirschner et al., 2004). The argument of Kirschner et al. that three affordances (educational, social and technological affordances) are indispensable for an ICT tool to be deemed useful is widely acknowledged in the existing literature (2004). In our study, we also adopted this affordance analysis framework. However, two minor changes were made to the framework to suit the purpose of the present study, resulting in our own proposed framework for analyzing wiki affordance. Firstly, we renamed the educational affordance dimension as the pedagogical affordance dimension. We reasoned that as our target audience comprised of beginning teachers, 'pedagogical affordance' would be more specific and appropriate for the context. Secondly, we specified technical affordance instead of 'technological affordance' to refer to the technical features available in the Web 2.0 tools, such as ease of use and error-free

navigation for designing case-based learning environments.

To reiterate, 'pedagogical affordance' refers to the characteristics of an educational resource to bring about a particular learning behavior that could possibly be enacted within the teaching and learning context; 'social affordance' refers to aspects of the educational resource that provide social-contextual facilitation relevant to the learner's social interaction and 'technical affordance' to the characteristics of the educational resource that affords learners' efficient use of the educational resource.

It is important to take note of the relative importance of the three categories of affordances in evaluating the usefulness of an ICT tool. Prior research has emphasized that pedagogical and social affordances reflect the core educational values of ICT tools (Chen, 2003). These affordances determine an ICT tool's potential for use in a teaching and learning context. If an ICT tool has pedagogical and social affordances, it undoubtedly has pedagogical potential. However, this is heavily influenced by its technical affordance. Therefore, technical affordance is a necessary but not sufficient condition for an ICT tool to be considered potentially useful for teaching and learning.

Using Wikis To Support Learning In Higher Education

Duffy and Bruns (2006) highlighted several pedagogical affordances of wikis in terms of multiple authoring, publishing and sharing resources in a learning community. Wikis are used as group authoring tools in carrying out projects, documenting and reviewing work, and also as a tool that facilitates peer interactions. Wikis allow group members to build and edit a document on a single page, such as Google Sites, Wikipedia, Wetpaint and PBWiki. Wikis are also used as tools for instructors to publish course resources (i.e., course outlines and content), and for students to access, edit and comment on these resources directly.

Moreover, learners can assume an active role as authors in writing and publishing collaboratively the content in wikis (Forte & Bruckman, 2006). Wikis are flexible tools for the co-construction of knowledge and collaborative learning among learners (Hew & Cheung, 2010). They facilitate the sharing of resources. They offer students the means to exchange ideas, share multiple perspectives and clarify understandings (Coutinho & Bottentuit, 2007). To complement instructor's roles as managers and facilitators, wikis also facilitate learner-centred learning environments in which learners engage in brainstorming and decision-making on given topics, leading to coproduction of a rich network of resources.

Several empirical studies have examined how wikis affect learning in higher education (Chu, Leung, & Lee, 2011; Coutinho & Bottentuit, 2007; Forte & Bruckman, 2006; Koh & Lim, 2012). The second and third of these studies relied primarily on students' retrospective self-report data, in the form of questionnaire responses, to determine whether the use of wikis helped them to learn a particular subject matter (Coutinho & Bottentuit, 2007; Forte & Bruckman, 2006). Drawing on questionnaire data from 16 postgraduates who attended a program on research methods in education in Portugal, Coutinho and Bottentuit (2007) explored whether the students' use of wikis in groups to research and write about one research method helped them to learn. Students reported that the wiki activity not only helped them better understand the topics, but also facilitated their learning. Similarly, Forte and Bruckman (2006) examined the use by political science freshmen of wikis. The students used wikis as a staging ground to choose issues, share resources, critique peers' work and publish final essays. Based on students' interview data, the study found that student interactions via wikis helped to improve their quality of their writing.

So far, few research studies have investigated teachers' perceptions of affordances of wikis in LAMS and Google Sites, determine how their perceptions could be used to shed light on the potential for using these tools to support learners' case-based learning and suggest how the perceptions might provide valuable insights into the design requirements of technology-supported case-based learning environments.

Research Questions

This paper reports a part of the larger-scope research study on teachers' case-based learning in wiki learning environments hosted differently in LAMS and Google Sites. It is not the intention of this study to compare platforms but rather to explore the potential affordances of Web 2.0 tools for designing teachers' case-based learning. It attempts to address the following two research questions:

To what extent, did the LAMS tool provide the required affordances to support teachers' case-based learning?

To what extent, did the Google Sites tool provide the required affordances to support teachers' case-based learning?

Specifically, guided by the affordance framework (in literature review) and the requirement for teachers' case-based learning, the design of learning environments in wikis are hosted in two separate platforms. Teachers' survey responses and online reflection logs are gathered to explore the affordances of wikis in supporting teachers' case-based learning environments.

Methodology

Research Design

There are two reasons for our adoption of the case study approach: it is not only appropriate for exploring contemporary phenomena (Yin, 2003) but also enables researchers to reach a deep understanding of the dynamics present in a situation being investigated (Eisenhardt, 1989). In Case One, 15 teachers participated in the case-based learning environment designed by LAMS tool and in Case Two, 17 participated in the environment designed by Google Sites. The data obtained from the two cases were analyzed and reported separately.

Sample

These 32 beginning teachers from 20 randomly-selected Singapore secondary schools were invited to attend a funded two-day research workshop entitled "Inquiry-based Learning on Classroom Management" on problem-solving teacher-generated classroom management cases. The teachers were all less than 35 years-old with less than two years of teaching experience and had graduated from their teacher education courses in Singapore.

Designing Teachers' Learning Tasks And Selecting Tools With Required Affordances

The teacher-participants' case-based learning was an inquiry into their own classroom management cases. The six learning stages of cases, the affordances of the tool and key features of the learning environment for each learning stage are elaborated as shown in Figure 1:

Read Own Written Classroom Case (Individual Learning)

In order for teacher-participants to read and listen to their classroom cases, the 'read-ability', 'listen-ability' and 'view-ability' of the wiki were mandatory. Moreover, since they might like to play back and review a previous learning sequence, 'play-back-ability' and 'easy navigation' would be necessary features to support their case-based learning.

Analyze Own Case (Identify Problems, Post Solutions for Sharing with Peers, Individual Learning)

To enable and guide their analysis of their own cases (identify problems, suggest solutions and post them for sharing with peers in both written and audio formats), it was felt that beginning teachers should be stimulated to respond to some guiding questions. Thus, predetermined guiding questions needed to be integrated into and displayed in the learning environment. Moreover, since the students' analysis process was realized through writing and voice-recording formats, they should be able to write, record their thinking processes and use multi-media to present their ideas and cases with peers. Hence, the 'read-ability', 'write-ability', 'view-ability', 'revise-ability', 'record-ability', 'access-ability', 'publish-ability' and 'share-ability' features would be necessary. Other features such as 'play-back-ability', 'easy navigation' and 'browse-ability' would be deemed desirable.

Exchange Own Case with That of Peer's, Read and Analyze the Peer's Case (Pair Learning)

In order for teacher-participants to exchange their cases with their peers in a timely manner (a one-for-one exchange), they would require unlimited access to the paired peer's case both in written and audio formats. To support their analysis of their peers' cases, they would also need to be provided with guiding questions that could be displayed in the learning environment. Moreover, as their analyses of peers' cases were required in written and audio recorded formats, they should be supported with ease of recording and uploading features in the learning environment. Hence, the 'read-ability', 'write-ability', 'view-ability', 'revise-ability', 'record-ability', 'access-ability', 'publish-ability', 'share-ability', 'play-back-ability', 'easy navigation' or 'browse-ability' features were all considered necessary.

Re-visit Own Case (Evaluated the Peer's Problem Identification and Suggest Strategies- Individual Learning)

For teacher-participants to re-visit their own cases and evaluate their peers' input and feedback, features such as 'share-ability' and 'view-ability' were required. To further support their re-visits, the 'access-ability' feature (to navigate to their own cases in both written and audio formats) would be essential.

Discuss Cases with Peers to Propose Solutions (Group Learning)

To support teacher-participants' collaborative learning with peers and experts, and make them to be willing to share, learn from others and be able to interact with peers and experts, they should be allowed to use all forms of media to present and share their ideas with peers and experts. They should also be able to comment on their peers' responses. In other words, features such as 'read-ability', 'write-ability', 'view-ability', 'revise-ability', 'access-ability', 'publish-ability', 'share-ability' and 'browse-ability' are all considered necessary.

Reflect and Make Decisions of the Proposed Solutions to Their Own Case (Individual Learning)

To support their online reflection and final decision making on their own case solution, the teacher-participants should be able to review all the learning processes that have gone through before, so, features such as 'easy navigation', 'browse-ability', 'play-back-ability' and 'access-ability' (to peers' cases and comments) are required. Moreover, they should be able to document their reflections online. Thus 'write-ability', 'revise-ability', 'resize-ability' and 'move-ability' features are also essential.

In this exploratory study, the researchers designed teachers' case-based learning environments on the basis that technical affordance would not to be regarded as a separate entity but the driving force to support pedagogical and social affordances. Using the work of Bower (2008) to further analyze the design of case-based learning environment together with wiki's affordances, key features needed to support teachers' case-based learning environment were identified (Fig. 1).

Required Affordances of wiki Case-based learning Tasks	Technical Affordance																
	Pedagogical Affordance											Social Affordance					
	read-ability	view-ability	listen-ability	write-ability	record-ability	Access-ability	review-ability	browse-ability	revise-ability	reflect-ability	play-back-ability	share-ability	Comment-ability	navigate-ability	publish-ability	seek for expert support	discuss-ability
(1) Read own written classroom case	✓	✓	✓	✓	✓	✓		✓			✓			✓		✓	
(2) Analyze own case (identify problems, post solutions for sharing with peers)	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	
(3) Exchange own case with that of peer's, read and analyze peer's case (identify the problems, suggest strategies)	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
(4) Re-visit own cases (evaluate the peers' problem identification and suggest strategies)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(5) Discuss cases with peers to propose solutions	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(6) Reflect and make decisions of the proposed solutions to their own case	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Figure 1: diagnosing the required affordances of tools for teachers' case-based learning tasks

Selecting Suitable Web-based Learning Tools

With our requirements for case-based learning in mind, we explored two wikis in LAMS and Google Sites for this study.

LAMS is an open-source learning design system for designing, managing and delivering online collaborative learning activities (LAMS International, 2009). It has an intuitive visual authoring environment and a wide range of pre-installed tools such as chat, discussion forum, wiki, sharing resource, questions and answers. All of these features allow LAMS to be used effectively by the designers to create sequences of activities such as individual learning, group work and whole class learning based on both content and collaboration requirements. The learning environment in LAMS defines the learning sequence tightly in terms of which resources and activities are accessed, so it offers a more guided learning experience than what is offered in the Google Sites.

Google Sites is an open-source system which is also used to design, manage and deliver online learning sequences. Like LAMS, it offers the ability to create learning webpages and supports the integration of tools such as chat, discussion forum, wikis and resource sharing. Although it does not have the same range of pre-installed plugins as LAMS, it does have strong research and development center offering numerous applications that can be installed quite easily by designers according to the requirements of the learning activity design. Google Sites provides with learners more flexibility than LAMS in terms of the order in which resources and tools are navigated or used. This may affect teachers' perception of the usability of these tools for the design and development sequences.

To support the two groups of teacher-participants' case-based learning on-line, learning activities were created in LAMS and Google Sites (see Fig. 2). Specifically, each participant carried out the six learning steps described above. As a monitoring tool, LAMS allows researchers or educators to track participants' progress through a linear progression of activities pre-determined by the instructors, whereas in the case of Google Sites, the instructors and learners share equal status. In other words, the control is shared between the instructors and learners. As a collaborative learning tool, LAMS structures the participants' learning with peers sequentially such as listening, reading and responding to peers' cases (using text and voice). In Google Sites, learners and their peers can gain access to the learning activities any time. They can re-visit their incomplete learning activities at their own pace, unlike the case of LAMS, where learners in the group are expected to finish the learning activity before they proceed to the next one.

In order to support the learning outcomes, technical features (e.g., easy to use, able to support multi-media presentation) have been designed into wikis supported by LAMS and Google Sites respectively. To further scaffold teachers' learning, we added built-in features such as 'Help', 'Resources' and 'Expert's support'. The last allows the instructor to play roles such as initiator, maintainer and mediator when called upon by teachers. These features serve as a 'bridge' between the real world teaching and the educational concepts of classroom management to teachers.

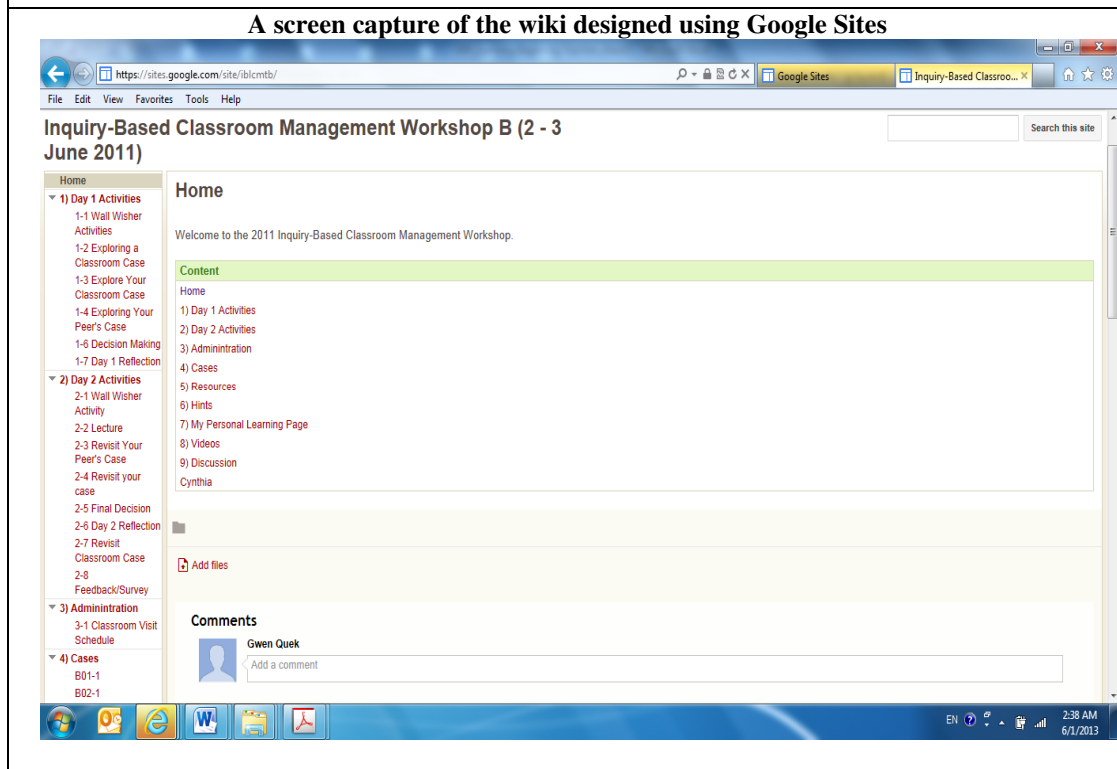
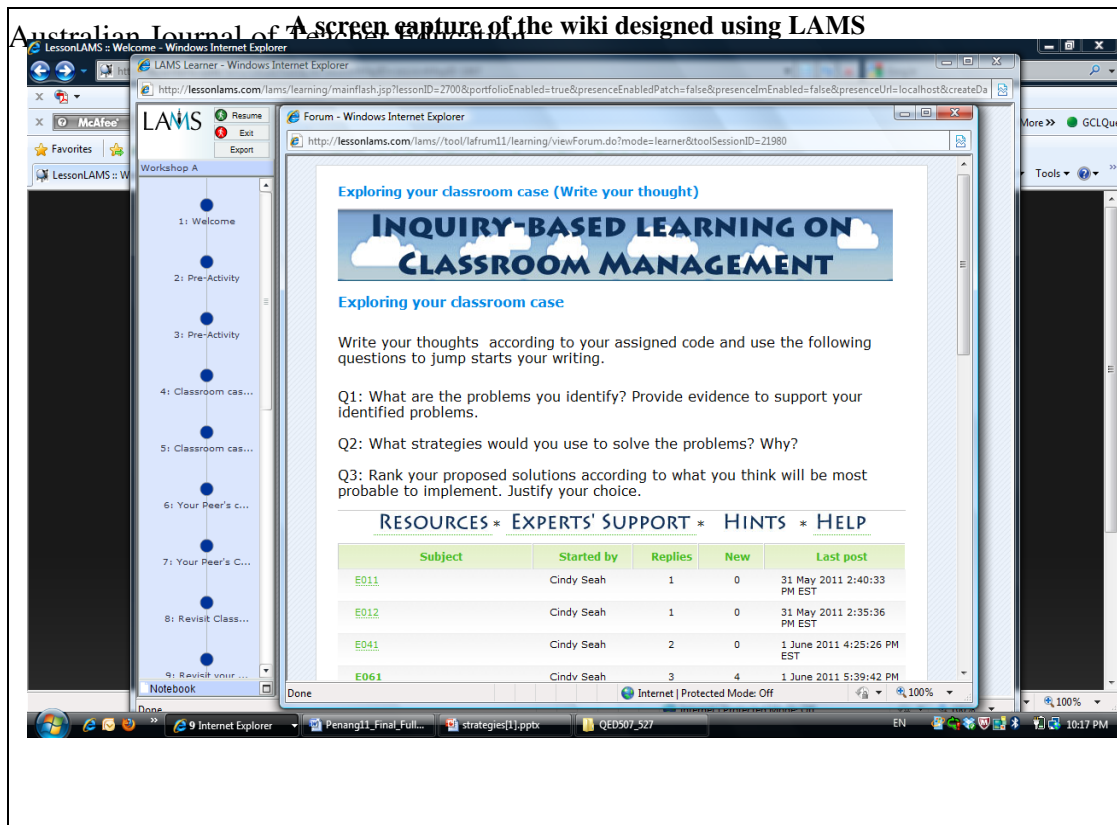


Figure 2: screen captures of wikis designed using LAMS and Google Sites

Data Collection and Analysis

The data for both cases were collected quantitatively and qualitatively at the end of the workshops conducted at National Institute of Education, Singapore. The quantitative data were collected from teacher-participants' responses to the survey (see Tab. 2 and Tab. 3) administered at the end of the workshop. The survey was modified from the previously used version for another study (Wang, Woo, Quek, Yang, & Liu, 2012). We did not validate this

survey as our sample size was too small and this would not be appropriate for the factor analysis as validation requires large size of samples. The qualitative data from these teachers' reflection logs and online scripts. Descriptive statistics (means and standard deviation) were computed for the quantitative data. Content analysis was performed on the qualitative data (including 45 post entries extracted from LAMS and 198 post entries extracted from Google Sites) separately using the adapted version of Kirschner et al.'s (2004) framework (Tab. 1).

Categories	Description	Example
Technical affordance	The potential of the wiki tool that affords learners' efficient use of the educational resources that are hosted in it.	"...I like the wallwisher and I would definitely incorporate the tool into my lesson where possible."
Social affordance	The potential of the wiki tool in promoting social-contextual facilitation relevant to the learner's social interaction.	"I appreciate the sharing and feedback given to me by my peers...."
Pedagogical affordance	The potential of the wiki tool in achieving instructional objectives that are designed within the teaching and learning context.	"...I will make use of the probable solutions suggested by my peers to help me in my classroom management."

Table 1. The adapted Kirshner et al.'s (2004) affordances category system

Qualitative analysis of Case One (class in LAMS) by an independent coder generated 10 codes of discussion for technical affordance, 16 for social affordance, and 23 for pedagogical affordance. To check the reliability of the coding, the first author recoded the same data using the same coding scheme: 12 codes of discussion for technical affordance, 16 for social affordance, and 27 for pedagogical affordance were identified. Inter-coder agreements for technical, social and pedagogical affordances were calculated, yielding 83 percent (10/12), 100 percent (16/16), 85 percent (23/27) respectively, which was acceptable, thus lending support to the reliability of analysis. The disagreements found between the two coders were then resolved through further deliberation. Ultimately, 12 codes of discussion, 16 codes of discussion, and 27 codes were identified for technical, social and pedagogical affordances respectively.

Qualitative analysis of Case Two (class in the Google Sites) by an independent coder generated eight codes of discussion for technical affordance, four for social affordance and six for pedagogical affordances. To check the reliability of coding, the first author recoded the same data using the same coding scheme. Inter-coder agreements for technical, social and pedagogical affordances were calculated, yielding 100 percent (8/8), 88 percent (3.5/4) and 92 percent (5.5/6) respectively, which was acceptable, thus supporting the reliability of the analysis. The disagreements between two coders were resolved through deliberation which ultimately did not affect the number of codes identified.

Findings and Discussion

Case One: 15 Teachers' Case-based Learning In The Wiki Designed By Using LAMS®

To answer the first research question (whether LAMS met our requirement for teachers' case-based learning), quantitative findings of teachers' perceived affordances and qualitative findings on online scripts and reflection logs are presented jointly. Table 2 shows the means and standard deviations of teachers' responses.

Statements	Class-LAMS (N=15)
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	M	SD
Pedagogical affordance		
1. The design of “Help” function in the online environment is helpful in collaborative learning.	3.00	.655
2. The design of “Hints” function in the online environment is helpful in group collaborative problem solving.	3.13	.640
3. The design of “Expert’s support” function is helpful in collaborative problem solving.	3.20	.676
4. The design of “Resources” function in online environment is helpful in collaborative problem solving.	3.47	.640
Pedagogical affordance experienced in Wiki	3.20	.484
Social affordance		
5. I learnt from my peer’s comments posted in online environment.	3.67	.724
6. The resources shared by my peers in online environment are helpful in collaborative problem solving.	3.80	.676
Social Affordance experienced in Wiki	3.73	.530
Technical affordance		
7. The online environment is easy to use.	3.67	.724
8. The online environment has facilitated my collaborative learning.	3.93	.594
Technical Affordance experienced in Wiki	3.80	.592

Note. Respondents answered according to a Five-point Likert Scale (5-Strongly Agree, 4-Agree, 3-Not sure, 2-Disagree, 1-Mostly Disagree).

Table 2. Means and standard deviations for teachers’ 10-itemed survey responses-class in LAMS®

Table 2 indicated that teachers perceived all three (technical, social and pedagogical) affordances in the wiki supported by LAMS. They perceived technical affordance (M=3.80, SD=.592) highest and pedagogical affordance (M=3.20, SD=.484) lowest. That technical affordance was rated most highly may imply that the wiki environment we set up in LAMS appeared user-friendly to these teachers, with the navigation buttons being found on the left side of the screen. Teachers could access and execute various learning steps designed for their case-based learning in a sequential manner without technical difficulties. The provision of feature such as the navigation buttons that are easy to use is essential to the future design of wikis in LAMS. On the other hand, the low score of pedagogical affordance may suggest that teachers either perceived limited pedagogical application given their brief exposure to this wiki learning environment supported in LAMS or had other concerns in view of their future applications in schools. This result, however, was quite unexpected. To explain the survey data further, examples of teachers’ reflection logs and online discussion scripts in relation to affordances are reported separately.

Technical Affordance

Technical affordance (which refers to the usability and intuitiveness) was perceived most highly.

I also find the use of Audacity to be a new experience as it is a good tool to record responses.

(Teacher 8)

...I like the wallwisher and I would definitely incorporate the tool into my lesson where possible.

(Teacher 5)

However, it should be noted that teachers found that some technical features could be further improved. As stated by the teacher in the following log, although Audacity empowered her in articulating vocal responses in a timely and effortless manner, she still considered that she should be given choices in choosing a communication mode (writing or speaking) for expressing her thoughts.

I still think that articulating our thoughts both in audacity and in text is redundant, and it would be great if we were given a choice to do either one that we are better in.

(Teacher 9)

Social Affordance

Social affordance (which refers to the wiki's potential in promoting social interaction among learners as well as between instructors and learners), deals with the exchange of views, identification of feelings, development of friendships and sharing of resources in the wiki. That social affordance was moderately rated affordance may have been anticipated, as one of the widely-assumed benefits of adopting Web 2.0 tools in the education contexts is to create and enhance communication and interaction between students. The findings may imply that the wiki environment in LAMS promotes multi-level social interaction among students as well as between instructors and students. Participating teachers may enjoy being able to exchange views, feelings and resources among peers and seek help from instructors or experts easily. The embedded applications in LAMS facilitate collaborative learning with peers. Social affordance should be considered when designing learning tasks in the wiki in LAMS. To probe further why teachers perceived social affordance moderately highly, examples of their discussion of the affordances and constraints from their reflection logs are provided.

It is good to receive feedback and suggestions from my peers who can review my lessons which may be blind spots for me to discover....

(Teacher 8)

I am glad to receive inputs and suggestion from my peers on my case.

(Teacher 6)

I appreciate the sharing and feedback given to me by my peers....

(Teacher 4)

The peer's response has also given me another perspective and suggested good feedbacks on how certain situations can be handled.

(Teacher 5)

...by going through the different cases with my peers, I realized that some problems are common to everyone and we help each other to gain confidence.

(Teacher 13)

In summary, teachers seemed to concur that the wiki in LAMS did provide them with a place to publish comments, share resources and obtain feedback from peers, so the features provided in this design of case-based learning environment may be said to facilitate their collaborative learning. Moreover, it offers them a way to gain confidence, motivation and insights.

Pedagogical Affordance

Pedagogical affordance (which refers to the potential of the LAMS wiki environment in achieving instructional objectives) was perceived lowest, suggesting limited pedagogical application of LAMS wiki in a teaching and learning context. However, we did find potential pedagogical applications in their reflection logs, as seen below,

...was interesting to go through thinking my case and seeing the case of others [posted in wiki].

(Teacher 5)

I have realized the problems with style of management and I will make an attempt to put in more effort in designing lessons that are engaging and of an appropriate level to students.

(Teacher 2)

...my involvement in providing feedback to my peers' cases [posted in wiki] has also given me a good gauge of how those proposed strategies to be used on my class can work.

(Teacher 3)

...I will make use of the probable solutions suggested by my peers [posted in wiki] to help me in my classroom management.

(Teacher 8)

In many ways, the online discussions and feedback [posted in wiki] received have reaffirmed my beliefs about the efficacy of my classroom management strategies....

...through the exchanging of ideas/methods to handle the different types of scenarios [posted in wiki], I have learnt some new ways I can adopt. However, I am still aware that some might work for the type of students I work with but some cannot.

...I feel that I should review the strategies by [posted by peers online] that I have learnt today. I will keep an open mind and try some strategies in my class.... I think I have to keep in mind that it also takes time for some suggestions to take effect. It also may not work the first time, so I will have to refine them to suit my class.

(Teacher 4)

In summary, although teachers perceived the lowest pedagogical affordance in LAMS wiki, they found that the wiki had features that supported their case-based learning with peers and enabled them to achieve their learning goals. Specifically, the learning activities were linearly structured in a linear fashion moving from problem identification, to solution generation to self-reflection for their co-construction of knowledge via discussions with peers. They were able to obtain peers' input and build upon multiple perspectives and insights gained. The low rating given to pedagogical affordance perceived in LAMS may be explained in the following ways: first, teachers were occupied in completing the highly-structured learning sequences in LAMS and might not have been given enough time to explore and appreciate the potential of those additional built-in features and use them to assist their collaborative learning. Secondly, teachers need longer time to develop an understanding

of the pedagogical benefits experienced in the wiki environment as compared with its more immediately experienced benefits such as usability and the promotion of social interaction. Thirdly, it is also possible that the phrasing of statements under the pedagogical dimension may have caused teachers to interpret them in different ways. For example, some teachers were not sure whether the statements presented under the pedagogical affordance were intended to assess their perception of the currently experienced wiki supported case-based environment in the workshop or the pedagogical affordance of wikis as a whole. This may have inhibited them from articulating fully the pedagogical affordance experienced in the wiki environment. Teachers may have been cautious and needed time to think about the potential teaching and learning opportunities embedded in the wiki environment before adopting it in their teaching. Moreover, given the age of the learners (14-17) with whom they work, they may have been concerned about the complexity involved in designing well-structured learning activities for students to work with peers in the wiki. They may also have realized that their possible use of wiki in a high school would be different from learning with adult teacher peers. They need time to develop a deeper understanding of the wiki and of issues such as assessing, making appropriate instructional decisions and designing collaborative learning activities for their students.

Case Two: 17 Teacher's Case-based Learning In The Wiki Designed By Using Google Sites®

To answer the second research question, quantitative survey data based on 17 teachers' perceived affordances of the wiki in Google Sites and qualitative discussion examples from their reflection logs and online scripts are presented. Table 3 summarizes the means and standard deviation scores of teachers' responses in the survey.

Statements	Class-Google Sites (N=17)	
	M	SD
Pedagogical affordance		
1. The design of “Help” function in the online environment is helpful in collaborative learning.	3.35	1.057
2. The design of “Hints” function in the online environment is helpful in group collaborative problem solving.	3.18	1.015
3. The design of “Expert’s support” function is helpful in collaborative problem solving.	3.12	.928
4. The design of “Resources” function in online environment is helpful in collaborative problem solving.	3.24	.903
Pedagogical Affordance Experienced in Wiki	3.22	.901
Social affordance		
5. I learnt from my peer’s comments posted in online environment.	4.18	.529
6. The resources shared by my peers in online environment are helpful in collaborative problem solving.	3.76	.970
Social Affordance Experienced in Wiki	3.97	.515
Technical affordance		
7. The online environment is easy to use.	4.06	1.029
8. The online environment has facilitated my collaborative learning.	4.00	1.061
Technical Affordance Experienced in Wiki	4.03	1.023

Note. Respondents answered according to a Five-point Likert Scale (5-Strongly Agree, 4-Agree, 3-Not sure, 2-Disagree, 1-Mostly Disagree).

Table 3. Means and standard deviations for teachers’ 10-itemed survey responses-class in Google Sites

In Google Sites, the teachers perceived pedagogical affordance ($M = 3.22$, $SD = .901$) lowest, and technical affordance ($M = 4.03$, $SD = 1.023$) highest. The perception of social affordance ($M = 3.97$, $SD = .515$) was moderately high. The findings for technical and pedagogical affordances may suggest that the wiki environment that we designed in Google Sites was technically conducive to supporting teachers’ case-based learning. The incorporation of various technical features such as Audacity (the link used for teachers’ voice recording) and the input function for text may have empowered teachers to effectively

execute various learning steps. Moreover, the finding that teachers perceived the lowest pedagogical affordance lowest may suggest that they saw limited application to their anticipated teaching contexts. That social affordance was moderately rated may imply that the wiki environment in Google Sites promoted multi-level social interactions. Some of the activities in wiki included exchanging views, sharing resources and seeking help from experts. To explain the survey data further, examples of teachers' reflection logs and online discussion scripts in relation to technical, social and pedagogical affordances are reported separately.

Technical Affordance

Ease of access and use are some features of the Google Sites wiki. Concerning this dimension, in their reflection logs, teachers expressed that:

I found sharing online through vocal recording and written response very 'safe' and 'secure.' Hiding behind the computer [in the wiki] let me express more freely and unreservedly.

(Teacher 31)

I get to read my peers' comments.

(Teacher 26)

I agree that the self-help guide [online] (is an effective instant solution to the problem of teaching...).

Teacher 16)

I've learnt to use Audacity to record audio for lessons or reflections [in wiki]. This forced me to just speak off what's on my mind instead of planning what to say.

(Teacher 25)

It was clear from the above comments that teachers enjoyed very much using various functionalities (such as articulating response via Audacity, Self-guide) of this learning environment and considered these functionalities to be secure, easy-to-use and conducive to collaborative learning.

Social Affordance

Promoting multi-level social interactions among the learners as well as between the instructors and learners is the feature of the wiki. Regarding this dimension of affordance, in the teachers' reflection logs, teachers expressed that:

...I am glad to hear and read my peer's comments about how I should handle my class.

(Teacher 23)

My peers' opinions are valuable as some of them assure me on the stands that I am taking in deciding my classroom management and ideas on the solutions....

(Teacher 24)

Judging from the above teachers' reflection, teachers seemed to concur that the wiki in Google Sites provided them with a safe place to publish comments and obtain feedback from peers, so it facilitated their collaborative learning. Moreover, by enabling them to exchange ideas with peers, it also offered them a way of gaining confidence, motivation and insights.

Pedagogical Affordance

Pedagogical affordance refers to its potential in enabling learners to achieve the outcomes of instructional objectives. Examples of consideration include the learner characteristics, nature and scope of task for active and collaborative learning when designing learning to take place in the wiki environment. In teachers' reflection logs, they expressed their concerns in using wiki in Google Sites. Two of the teachers commented as follows:

By exploring their case [peers' case], it gives me an insight into some classroom management issues and what can be done to avoid them.

(Teacher 30)

I think the use of Wiki is COOL! But my consideration is that it may only work with disciplined, high-ability learners. Perhaps I'm not ready to implement this tool for my NA [Normal Academic stream refers to low achieving students in Singapore secondary school] classes.

(Teacher 21)

Through the exchanging of ideas/methods to handle the different types of scenarios, I have learnt some new ways I can adopt.

However, I am still aware that some might work for the types of students I work with some cannot...

(Teacher 19)

In these two case studies, teachers perceived the technical affordance of both wikis most favorably. In Google Sites, this could be due to the ease of access, navigation and flexibility of the wiki. One reason for the ease of entry was that teachers simply accessed the wiki using their emails signed up with Google. Their initial positive learning experiences could possibly have influenced their subsequent learning experiences and completion of learning tasks. Another reason for the simple and flexible navigation in this wiki was that teachers could access any stage of the learning activity at any time. However, this flexibility was not found in the structured environment of LAMS as the learners had to complete each learning activity sequentially before moving on to the next one.

That Teachers perceived the pedagogical affordance of the wiki in Google Sites least favorably could be due to their online role (involving facilitation rather than teaching) when using wiki for teaching, because they feared not being able to control the learning outcomes of their students. Moreover, their high school students would have access to the wiki easily at anytime and anywhere because of free Google mail accounts, unlike LAMS, where only the teacher controls the availability of accounts. Perhaps, they also needed more time to experience learning opportunities with the wiki before they developed a deeper understanding of the affordance of the wiki in Google Sites and made appropriate instructional decisions, such as designing collaborative learning activities.

Teachers perceived social affordance moderately high, which could be explained by the fact that the wiki itself is a social learning tool that promotes multi-level social interactions among the students as well as between the instructor and students. It enables students to publish comments, exchange views and feelings and develop friendships with peers.

Conclusion

This study explores the teachers' perception of wikis' affordances hosted in the two Web 2.0 tools (LAMS and Google Sites) for supporting their case-based learning. The findings from these two case studies revealed that teachers perceived almost similar high degree of technical and social affordances and comparatively lower pedagogical affordance in these two wikis. Indeed, given the teachers' case-based learning requirement, these two wikis afforded technical features to support teachers' case-based learning to solve classroom management cases. The social affordance that promotes social interactions among the learners, experts and learning content were evident from the design features provided. Such multi-level exchanges in turn offer the teachers a means in gaining confidence, motivation and insights in the learning process.

Despite the learning benefits experienced in using these wikis, some teachers reported constraints. Nevertheless, most of the learning objectives were achieved with the support of the combined utilities of wiki. And the teachers still regarded their learning experience in both wikis positively. On the whole, these two wikis were regarded as enabling tools for supporting teachers' case-based learning.

The lowest pedagogical affordance perceived by teachers does not rule out the wikis' promising potential as effective tools for supporting student learning in the higher education context. Further research involving larger samples and across more classrooms in Western and Asian contexts could be undertaken in terms of the effects of social and cultural factors and wiki pedagogy on longitudinal studies.

Teachers' perception of wikis' affordances provided not only valuable feedback for the evaluation and subsequent improvement of these case-based learning environments in this research. It has also generated useful information for researchers who are planning to design more robust teacher learning environment using Web 2.0 tools or beyond.

Specifically, our findings reveal the extent to which wikis support teachers' collaborative learning and student-centred teaching. In view of our findings, we suggest that to teach in wikis, instructors should be fully aware of the student-empowerment which is a critical factor for the full realization of the potential of social network sites in student learning and peer networking. Instructors are therefore encouraged to develop wiki-supported pedagogy as they design online activities in which students can select and share learning resources and start or end each class with their own creative products. This is one way to democratize the learning environments, with students' voices being heard and to bring about more meaningful learning through participation. Moreover, thoughtfulness and care among instructors in scaffolding learners' learning road maps through an understanding of their characteristics, the availability of curriculum time (online or blended) and the design of interesting student-centred learning activities, are necessary for their pedagogy to be effective in wikis.

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