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ABSTRACT
While several research emphasize inadequate sharing of knowledge as a major challenge of knowledge management systems (KMSs), a growing culture and practice of knowledge sharing thrives in certain virtual communities. This paper explores the wealth of literature to exploit the potentials of emerging technologies such as wiki, blog and social networking site (SNS) for knowledge sharing in higher education institutions (HEIs). We aim to better understand how the personal acts of knowledge construction and the communal efforts of knowledge sharing may be effectively adapted for HEIs in a bid to balance technology and tradition. While we think the HEI as a learning organization, we attempt to re-contextualize Web 2.0-based communities for effective knowledge sharing, where several types of education may be integrated and mapped with existing and emerging pedagogical approaches to foster active, social and engaging learning experience. We propose a conceptual knowledge sharing framework based on the assumption that volunteers and contributors in the virtual communities are encourage more by communal (or ‘altruistic’), than self-centered, motivations.

Keywords
Web 2.0, knowledge sharing, flexible learning, pedagogy, content management, higher education

1. INTRODUCTION
Less than a decade ago, Dalgarno [22] posit a constructivist view that learning occurs within a social context, and that interactions between learners and their peers is a necessary part of the learning process. From the constructivist perspective of learning, each person forms their own representation of knowledge [22][3]. Considering Foray’s theory of knowledge reproduction [17] as well as Benkly’s theory of peer production [18], Allen [19] defines knowledge sharing in Web 2.0 communities as a peer-based knowledge reproduction. While the ability of learners to construct knowledge has been empirically documented in several findings, there is a growing need for an active, social, and engaging learning platform for knowledge sharing in today’s post-secondary academic institutions. In this paper, we analyze and demonstrate how higher education stakeholders may support knowledge sharing in an effective learning environment by using social web pedagogical approach. With a focus on knowledge sharing, we attempt to characterize higher education institutions (HEIs) as learning organizations that are required to strategically drive a nation towards the knowledge society [16].

We survey three different categories of social web tools - wiki, blog and social networking site (SNS) to improve knowledge sharing in a tripartite (faculty-faculty, faculty-student and student-student) correlation. Allen [19], posit two solutions to the incentive problem of knowledge sharing – (i) increasing financial reward and, (ii) encouraging pro-social behavior through group identity or other social processes. On one hand, while the increase of financial reward has been commonly conceived by many as a panacea to the incentive problem of knowledge sharing, this approach may not only spur a self-centered motivation in individual contributors, but will also result in an unstable ecosystem that is capital-intensive. On the other hand, the socio-technical solution of knowledge sharing thrives on the principle of ‘wisdom of the crowd’ to ensure the sustainability of the ecosystem as well as increase the quality of contributions. This paper addresses two cogent research questions:

Research Question 1: How can we justify the adoption of social web approach for knowledge sharing in HEIs?

Research Question 2: How can we model the use and acceptance of social web for knowledge sharing in HEIs?

1.1 Background: problem and focus
While Alavi and Leidner [2] argue that the persistent challenge of knowledge management research is to discover the appropriate incentives and conditions for knowledge sharing, recent findings [4][20][19] indicate that knowledge is freely shared in the emerging information architecture that is founded on core principles of Web 2.0 applications: mix and match, wide distribution, flexibility, ease of use, multi-community and open systems. Ajjan and Hartshorne [24] suggest that though some faculty members are aware of the potentials of Web 2.0, only a few choose to use some of the emerging technologies to improve collaboration and knowledge sharing in and out of classroom. Our preliminary survey of three universities (one each, of public, private and foreign designation) in Malaysia concur with [24] that though technology use in and out of classroom has tremendously increased in recent years, the use has been practically limited to content delivery such as accessing course material and hosting static faculty portfolio.

While this paper reviews knowledge sharing in teaching and learning using social web, the focus is on content management within the context of HEIs. Several research findings show that learning content management systems (LCMSs) as well as learning management systems (LMSs) in the past 15 years have evolved into more integrated managed learning environments
1.2 Statement of the Problem
While education has been a fundamental human right since 1948, knowledge is considered as a major component of any activity in our society today; both are the driving forces of change and innovation [16]. However, there is inadequate collaboration and knowledge sharing in most HEIs, specifically in their current LCMSs that are vendor-specific and non-Web 2.0 compliant [20]. We argue that the effective sharing of knowledge in the ‘citadel of knowledge’ will not only unlock possibilities and inspire creative minds, but will also ensure that education supports a lifelong learning experience in any nation that must be reckoned with in the 21st century. Therefore, a common and enduring challenge to HEI stakeholders and the society at large can put as a question: “Each person forms their own representation of knowledge” [22]

“Learning occurs within a social context, and that interaction between learners and their peers is a necessary part of the learning process)” [22], p. 184

The “social web” has been linked with diverse theoretical perspectives and learning paradigms, namely social constructivism [13], constructionism [14] [15]. In-class situated learning as well as online interactions among learners must allow discourse structures that provide opportunities for knowledge construction and knowledge sharing [26].

2.1 Flexible Learning
While Ellington [35] suggests that the term ‘flexible learning’ was first used in the United Kingdom in the early 1980’s, the conceptual definition of the term is unclear [36]; however, several literature emphasize learner-centeredness and ICT component [36]. By the term 'flexible', we mean anticipating, and responding to, the ever-changing needs and expectations of virtually all the higher education stakeholders, including learners and communities. We are guided by an integrated model of flexible learning in HEI that comprises four elements – institution, implementation, pedagogy and technology i.e. information and communication technology (ICT) [34]. In this model, ICT is crucial as the core component that must connect others, especially the pedagogical component [34][16]. The focus of this paper is neither the emerging technologies nor today’s learners; rather we intend to re-conceptualize knowledge sharing within the flexible learning domain in HEIs by using social web approach.

So, we use online distance learning, e-learning and face-to-face (situated) learning to loosely describe flexible learning. Bullen and Janes [10], attempts to categorize several types of education as shown in Figure 1.

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**Table: E-Learning**

<table>
<thead>
<tr>
<th>E-Learning</th>
<th>Classroom Aid</th>
<th>Mixed-Mode: Classroom &amp; Online</th>
<th>Fully Online</th>
<th>Print, Audio Tape, Video Conferencing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-Face Classroom</td>
<td></td>
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<tr>
<td>Distance Learning</td>
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Figure 1: Types of education ([10], p.ix)

*Figure 1 shows the connection between on-campus and distance education; it also highlight the emergence of flexible / mixed / blended / resource-based learning that is given a thrust by the introduction of e-learning. Online distance education uses only digital technology to facilitate learning. Pure on-campus and paper-based distance education could be said to use only lecture (or on-campus experiences) and paper-based resources respectively (the latter with some analogue technologies such as audiotapes as well). As Figure 1 suggests, pure on-campus and distance education are extremes. Flexible learning provides significant opportunities between these extremes.*

(MLEs) with capacity for a wide range of functionalities and features [20]. However, empirical findings show that contemporary knowledge sharing and collaborative learning practices are not readily supported by many of today’s tertiary institutions in their LCMSs and LMSs [20]; teaching and learning models in these HEIs are mostly theoretical knowledge that are passive, materially-consuming, teacher-centered and one-size-fits-all [23][3][4][21].

Knowledge may be defined as a fluid mixture of experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information [1]. Knowledge construction and knowledge sharing occurs when learners engage in meaningful activities, activities that are authentic in a real situation [11]. For learners to achieve the goals of knowledge creation, knowledge construction must be connected with effective and meaningful knowledge sharing [32]. Web 2.0 applications have a number of core features that can make them useful in teaching and learning environments and are rooted in strong pedagogical underpinnings of constructivism [12]. Several research findings have strongly linked active, social and engaging learning that characterized Web 2.0 to constructivism. Dalgarno [22] describes constructivist view of learning in three broad principles, two of which are:
2.2 HEI: New Learning Organization

For the purpose of this research, we assume that the HEI is a learning organization where all stakeholders, particularly students and faculty are learners. Malone [25], suggest that students may become producers of new knowledge and information, instead of consumers of products and services designed and provided by faculty. While Alexander [4] describes the ongoing change in information architecture on the Internet that is driven by Web 2.0 culture and practices as “radical”, we argue that some faculty members may require both ‘just-in-time’ and ‘just-for-you’ professional development. Sharing professional experience is such an important element of professional growth that it has become axiomatic for in-service events to provide opportunities for participants to describe their experiences, reflect on the meanings of personal practice, and exchange interpretations with colleagues [5]. Many research and professional efforts have literally focused on providing solutions rather than addressing problems; many tools and techniques driven by innovative ideas from knowledge management theories and practices have creatively, yet unsuccessfully, attempt to unravel the knowledge sharing myth due to focus on symptoms rather than problems [6].

As technologies and societies continue to evolve, communication costs will continue to fall and the value of information communication will continue to increase; this will enable learning organizations to favor more decentralized organizational structures such as loose hierarchies, creativity, flexibility, motivation and other human values such as volunteerism that characterize Web 2.0 communities [29]. Senge [28] defines a learning organization as one that can create the results it truly desires. A learning organization should facilitate the learning of all the members of the community and continually transforms itself to meet current and future demands [28]. While centralization may never completely disappear from organizations, decentralization will lead the organization and its employees to think from ‘command-and-control’ to ‘coordinate-and-cultivate’ [29]. A decentralized organization will succeed with an overall framework of rules and guiding principles, written or unwritten, otherwise chaos is inevitable [29]. Having re-contextualize the HEI as a learning organization, we will describe, in the coming sub-section, the possibilities that abound when a changing tradition meet with a pervasive technology.

2.3 Web 2.0 and Flexible Learning

As a precursor to our proposed framework described in section four, we conceptualize a blend of flexible learning and Web 2.0 technologies in the emerging active, social and engaging learning environment that we identify as the ‘knowledge cloud’ (see Figure 2). Social constructivist approaches to learning drastically change the roles of the student and teacher. The students drive the discussion and the teacher serves as the guide or facilitator on the side [30]. The social constructivist approach is a pedagogy that is particularly well afforded by the use of discussion forums, blogs, wikis and on-line collaborative activities. It is a collaborative approach that opens educational content creation to a wider group including the students themselves [30]. As HEI shift from its’ traditional educational missions from providing instruction to providing learning, the resultant flexible learning can integrate with the Web 2.0 architecture. Flexible Learning is a learner-centric delivery methodology that provides students with choice over the structure, sequence, method, and timing of their learning activities. It is a set of educational philosophies and systems, concerned with providing learners with increased choice, convenience, and personalization to suit the learner. In particular, flexible learning provides learners with choices about what we learn, where, when, and how learning occurs.

Hammett and Collins [32] demonstrated that while depending on previous and current personal and professional experiences and knowledge, graduate students can construct knowledge during online interactions such as in a web conference. Today, Web 2.0 provides an opportunity for growth in educational and institutional flexibility in order to effectively support local and transnational education [31]. Our strategy is simply to move from the familiar terrain to the emerging environment; Alexander [4] argues that users (such as learners) now play a more fundamental and active role in information architecture.

We describe our knowledge domain as the ‘knowledge cloud’. Hypothetically, the ‘knowledge cloud’ represents an active, social and engaging learning environment or platform which necessarily include the following:

- Knowledge innovation
- Knowledge sharing
- Key process of KM
- Web 2.0-based knowledge community
- Knowledge hub (powered by RIAs, SOA & social web)

The Figure 2, represents our proposed ‘knowledge cloud’. The illustration depicts flexible learning consisting of the basic types of education on a virtual platform to provide ‘endless’ possibilities for knowledge sharing and knowledge construction. In the coming section, we will attempt to justify the adoption of social web approach for knowledge sharing in HEI on two fronts - technological and societal developments.
3. WEB 2.0: CHANGING TECHNOLOGY

In the face of a continuous shift towards self-directed and learner-centered learning, our technology-prone students meet some faculty members who are largely caught between tradition and innovation. The goals of higher education are primarily two-fold: (1) providing information, knowledge, and skills to meet a professional’s technical needs and (2) facilitating the attainment of wisdom and foresight [27]. If one of the primary aims of teaching is to encourage students to learn and to provide them with the tools and skills to do so, then emerging Internet technologies are arguably a good place to start with today’s higher education students. We assume that virtually all ‘active’ (for this research, those who spend at least one hour per week online) Internet users would have used one or more of the Web 2.0 technologies by choice or by chance in their everyday life, social and/or career. Tapscott [7] describe today’s technology-inclined students as ‘net-generation’ while Prensky [8] identify them as ‘digital native’. This generation of students who have grown-up digital come to expect digital technologies as part of their learning experience [9][16].

While change may be a constant and often expected phenomenon in all spheres of our live, the result of a transformation in one sector may have an overwhelming effect in other sectors. Taking a look at the big picture, we observe that while technological and societal developments are intertwining on one hand, there is a convergence of the changing physical world and the emerging virtual world on the other hand. Many have described the centre of the crossroad merger as the so-called ‘Second Society’. See Figure 3.

![Figure 3: Second Society: derived from Kool & Wamelen [37]](image)

Nowadays, the fast-growing front of socio-technological terrain as well as the coming together of both the physical and virtual worlds can be described in these seven folds: the sense of self, the death of distance, the power of presence, the sense of space, the capability to co-create, the pervasiveness of practice and the enrichment of experience.

Having established the theoretical underpinning of social web in the two preceding sections, we will now explain the technological and pedagogical application of social web as a socio-technical alternative to resolve the myth of knowledge sharing in organizations.

3.1 Contextualizing Social Web in Web 2.0

Technology which facilitates access to the course and completion of a program by all students in a course creates the opportunity for social interaction and knowledge construction [41]. Some people may still consider the term ‘Web 2.0’ as a ‘buzzword’; however, the values, culture and social movements that it represents are fast changing our online behaviour. Social web is currently used to describe how people socialize or interact with each other throughout the web - the rich multimedia portion of the Internet.

Seven social attributes that characterize social web applications, including wikis, blogs and social networking sites, are listed hereunder:

1. Identity: who are you?
2. Reputation: what do people think you stand for?
3. Presence: where are you?
4. Relationships: who are you connected with? who do you trust?
5. Groups: how do you organize your connections?
6. Conversations: what do you discuss with others?
7. Sharing: what content do you make available for others to interact with?

Web 2.0 technologies can act as a ‘just-for-you’ and a ‘just-in-time’ approach to facilitate collaborative knowledge-sharing and participatory knowledge-construction culture in higher education. Web 2.0 may be classified into three based on socio-technological perspective. These are rich Internet applications (RIAs), service-oriented architecture (SOA) and lastly social web. Figure 4 shows the contextualization of social web in Web 2.0.

![Figure 4: Social Web in Web 2.0](image)

While the development of the emerging technologies of social web, and indeed Web 2.0, may defy a generally accepted definition, the core values of mix and match, wide distribution, flexibility and bias for open systems will continue to be the driving force. The fusion of Web 2.0 and innovations such as the semantic web can only promise a more exciting future for the web. Having contextualized social web as a sub-set of Web 2.0, we may now, with the subsequent sub-sections, explain three social web applications- wikis, blogs and social networking.
3.2 Wikis
The word ‘wiki’ is the Hawaiian word meaning ‘quick’; it is also known as “What I Know Is”[42]. The first wiki was developed for use on the Internet in 1994. Wikis are collaborative tools that are fully editable web applications. Users can visit, read, reorganize and update the structure and content (text and pictures) of a wiki as they deem fit; this functionality is called open editing [42]. Arguably, the most popular wiki implementation is Wikipedia. Wikipedia allows users to modify entries by creating a reviewer and editing structure [4]. We suggest that more HEIs should adopt wiki as a learning tool with proven capacity to ensure knowledge sharing and construction amongst learners. Wiki is considered a Web 2.0 application that has come to replace classical encyclopedias like Encarta Online. Contrary to the concern held by many academics about governance and structure in a wiki, a team of researchers shows that the Featured Article (FA) ensures quality using peer-production mechanisms, and this characteristic is likely a key to their success in Wikipedia [43]. Viegas and his colleagues argue that the vast number of policies in Wikipedia and the existence of robust and formal processes indicate that governance is a thriving aspect of this community [43].

3.3 Blogs
Blogs are contractions for weblogs. Blogs are known to be a knowledge-sharing platform that gives the bloggers (i.e. content publishers) a huge opportunity to create and co-create personal and shared thoughts. The educational purposes of a blog could be to research, track, interpret, and evaluate content for political commentaries (with multiple perspectives), cultural events, business or other news and for examining change over time [4]. Learners may choose to learn and reflect in a creative method in order to gain knowledge [38].

3.4 Social Networking
The concept dates back to the 1960s (with University of Illinois Plato computer-based education tool [46]; however, online social networking has grown dramatically in recent years. According to recent research by Lenhart & Madden [44], online social networks allow users to create personal profiles and establish a variety of networks that connect him/her with family, friends, and other colleagues. While small rural communities such as a neighborhood subdivision can form offline groups, online groups are arguably the most popular and widely utilized. The continuing increase in subscribers, particularly teens, to social networking service providers has generated concerns amongst parents, school administrators and government officials about the disclosure of private information via these networks [44]. Research findings has it that 91% of U.S. teenagers who use social networking site do so to connect with friends and making new contacts [44]. Privacy and trust issues as well as the interconnections of profiles are vast [44][45]; however, there are ample positive pedagogical implications if activities are cultivated and coordinated by a well-developed policies and rules in a HEI. These online social networks can be adapted to better support active, social, and engaging learning environment for knowledge sharing and construction.

4. CONCEPTUAL FOUNDATIONS:
FRAMEWORK AND METHODOLOGY
This paper lays a conceptual groundwork for an on-going research. So far, we review literature extensively and analyze the participatory and collaborative features of Web 2.0 for knowledge sharing in HEIs. We consider three categories of HEIs (i.e. public, private and foreign) in Malaysia. In a preliminary survey, we scrutinized the online learning systems to identify the characteristic components of social web that may complement the existing information systems at the universities. This section of this paper presents our conceptual framework only in diagram, without a formal description of the processes. Here, we also use our proposed model to speculate and project the future theory and methodology for further research on how to identify the most effective methods of utilizing social web technologies to improve teaching and learning productivity. There is a crucial need for stakeholder in higher education to identify how Web 2.0 technologies may better support the emerging active, social and engaging leaning environments [24].

4.1 Conceptual Framework
We propose a conceptual framework for knowledge sharing in HEIs (see Figure 5). The underpinning concept for the framework is deep-rooted in the core principles of Web 2.0; our model is a socio-technical approach to knowledge sharing that is described and documented [19]. We will employ the classical technical, organizational and personal (TOP) model to present the underpinning theoretical constructs for our proposed knowledge sharing framework. Our significant contribution to knowledge in the conceptual framework is the possible extension of the TOP model to TOP-Communal (TOP-C).

Figure 5: Conceptual framework for knowledge sharing using social web approach
The key components of the conceptual framework are briefly listed as follows:
- **Knowledge crowd**: discussed in sub-section section 2.3 (see Figure 2).
- **Change agents**: the entire stakeholders in higher education including government and HEIs decision- and policy makers
- **Theory**: platform for engaging information systems (IS) theories. We will adopt UTAUT and TOP-C models
4.2 Future: Theory and Methodology

While the description of the hypothetic construct is on-going, we are considering the adoption of the unified theory of acceptance and use of technology (UTAUT) as an instrument to explain user intentions to use wikis, blogs and social networking systems and their subsequent usage behaviour in our proposed Web 2.0-based flexible learning environment – ‘knowledge cloud’. The theory holds that four key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) are direct determinants of usage intention and behaviour [39]. Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behavior [39].

Our future design of this continuing research will follow a 4-stage conventional method described in [40]: (i) thorough understanding of the constructs of the proposed framework and the underpinning theories; (ii) develop a formal description of the processes, in our case, this includes how to model the Web 2.0-based learning communities in HEIs and how to decide what adaptations are needed; (iii) develop framework tools to validate the theoretical framework; (iv) evaluate the developed tools to examine the effective methods of use and adoption of Web 2.0 technologies for teaching and learning.

5. CONCLUSION

Considering the three missions for the Universities - research, teaching and application of knowledge [33], we argue that the knowledge sharing and collaborative capabilities of some social web applications, specifically wikis, blogs and SNSs, may be harness to improve performance in a campus-wide use and acceptance that is supported by top management and decision makers. We argue that the on-going paradigm shift that is largely powered by emerging Web 2.0 technologies may be construed as a catalyst necessary to open up new research challenges in the domain of co-construction of knowledge in teaching and learning.

Hammett and Collins [32] established the importance of the connection between knowledge construction and knowledge sharing by using online systems before the advent of Web 2.0 through certain dissemination activities. The dissemination activity encouraged graduate students to revisit their knowledge in a different context, to select, analyze, synthesize, and translate it into a different discourse, gaining in the process a greater sense of their own expertise [32]. However, Web 2.0 technologies such as mashup, atom and AJAX provide superior potentials in terms of flexible interactions and creative participation. As educators, we need to be thinking about how to facilitate both legacy and future contents in the language of the ‘digital natives’ [8][16]. We argue that today's learning environment may not evade an imminent change that is fuelled by Web 2.0. While the older generation of faculty who are understandably ‘digital immigrants’ may not really grasp the ‘anyway, anytime’ pattern of the emerging architecture of participation, it is worrisome that more radical and virtual community-based learning environments are in the offering.

6. ACKNOWLEDGMENTS

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7. REFERENCES


