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Environmental design for a structured network learning society

Ben Chang *, Nien-Heng Cheng, Yi-Chan Deng, Tak-Wai Chan

Research Center for Science and Technology of Learning, National Central University, Jhongli 320, Taiwan

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Abstract

Social interactions profoundly impact the learning processes of learners in traditional societies. The rapid rise of the Internet using population has been the establishment of numerous different styles of network communities. Network societies form when more Internet communities are established, but the basic form of a network society, especially a network learning society, remains unclear. In 1998, a group of Taiwanese researchers created a network learning society, named ''EduCities''. Based on the experience of building this network learning society, the authors found that a structured network learning society architecture helps participants to coordinate and manage interaction processes. This study describes 10 basic elements involved in establishing a structured network learning society, i.e., participants, shared visions, devices, services, rules, relations, manners, learning domains, learning goals and learning activities. A structured network learning society environment, ''EduCities'', was then implemented based on the structured network learning society concept. EduCities included numerous structural designs, including EduCity, EduTown, EduSisterTown, EduVillage, EduSisterVillage, EduCitizen, and EduHome were practiced. Participants in EduCities own their roles, managing power, learning goals, and social relations. The structured network learning society concept represents a prototype of an online learning society.

Keywords: Learning communities; Architectures for educational technology system; Distributed learning environments; Elementary education; Improving classroom teaching

* Corresponding author. Tel.: +886 3 4227151/35404; fax: +886 3 4261931.
E-mail address: ben@cl.ncu.edu.tw (B. Chang).

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1. Introduction

Traditional community groups, such as family members, school students and teachers, and staff employees, have evolved into various organizations that exhibit different behaviors and tend to be long lasting (Owens, 1998). These traditional community groups profoundly impact the learning processes of learners. Vygotsky hypothesized that the potential for cognitive development depends on the "zone of proximal development" (ZPD). Moreover, full development of the ZPD depends upon full social interaction (Vygotsky, 1978). Although Piaget (1932) observed that individual children construct knowledge through their interactions with the world, constructivists also believe that much of reality is shared through a process of social negotiation (Cole & Wertsch, 1996). The concept of social learning thus was established, and various different meanings of the social learning are offered and elaborated. Social construction plays an important role in the interaction involving teacher and students. Cobb described the psychological constructivist and socio-cultural views as complementary (Cobb, 1994). From the perspective of Gergen, teachers are coordinators, facilitators, resource advisors, tutors or coaches (Gergen, 1995).

However, the development of information communication technologies (ICT) is changing the physical community (Nie & Ebring, 2000). Network and network learning communities have been created on the Internet (Wachter, Gupta, & Quaddus, 2000). Online activities now occupy a large part of peoples' lives, and numerous online communities have evolved (Preece, 2000; Rheingold, 2000). Unlimited possibilities exist for individuals to join and form niche communities based on interest groups, and Internet based learning communities are very successful. The Internet can help learners to learn together, and also can enable learners to benefit from resource and idea sharing. These rapid changes in the online community and online learning community have attracted traditional communities and enabled the establishment of online societies. The establishment of online societies has created numerous new issues. However, despite the creation of numerous and varied network learning communities on the Internet, the basic elements and framework of learning societies remain unclear.

How to design an online environment to support online learning society is a significant issue. The meaning of network communities differs among individuals. Brown (1998) indicated that social scaffolding is common and people learn from and with peers. Brown sees online learning communities as dynamic and inter-independent, diverse, partially self-organizing, fragile, and complex adaptive systems. However, the theory of "Structuration" developed by Anthony Giddens (Giddens, 1984) states that physical life is characterized by a duality of structure and actions. Structure simultaneously constrains and enables actions. Human actors not only follow rules, but generally act creatively. Adopting this alternative view requires first focusing on existing real social groups, including schools, classes, families, and offices. Members of real social groups learn, live, and work together, which involves daily face-to-face interaction. They share the same value system and trust one another (Turner, 1991). According to this view, building a network learning society offers the most obvious means of connecting social groups and attempting to cultivate these groups by developing social learning models that enhance the daily learning activities of members of actual social groups.

This study investigates how to apply information technologies to establish a structured network learning society. An example, EduCities, was established to test the structured network

learning society idea. EduCities comprises numerous learning communities that evolve into a preliminary structured network learning society. Based on the experience of developing network learning societies (Chan, Hue, Chou, Tzeng, & Ovid, 2001; Chang, Yang, Deng, & Chan, 2003; Chang, Chou, Chen, & Chan, 2004), 10 basic elements were found, namely participants, shared visions, devices, services, rules, relations, manners, learning domains, learning goals, and learning activities. The above 10 elements are the basic elements based on the experiences of the authors. The structured network learning society concept demonstrates a prototype online learning society.

2. Structured network learning society

2.1. Social design and EduCities

The Internet has created cyber spaces where numerous realities are possible. Because of the emergence of Internet-based learning societies, in 1998, a group of researchers in Taiwan attempted to build a social learning community plan, one of the goals was to establish an online society, named ''EduCities'' (Chan et al., 2001). ''EduCities'' was established to provide an architecture through which K12 learners could interact with others on the platform. The main users of EduCities were to be teachers, students, and parents. After the launch of EduCities, numerous participants began to use this educational purpose platform. These EduCities users organized their own learning communities, communicated with one another, and shared their learning materials and experiences. The original design concept of EduCities was an educational portal site via which Internet users could access online educational resources. Although EduCities successfully invited users to migrate to the educational network city, users present numerous requirements. One requirement was that both teachers and students still spend most of their time either at school or at home. Consequently, teachers and students are focused mainly on these environments, which they encounter daily, and where they have a sense of identify and belonging. Naturally, system designers cannot require users to conduct all of their learning activities via EduCities while neglecting their physical social learning environment. Instead, learning portal sites such as EduCities must be reorganized to suit school-based and class-based learning styles, particularly in K12 learning environments. Overall, physical social learning environments have a distinct organization and ecology, and educational portals should be designed accordingly. The EduCities website thus has been reorganized to meet user expectations. Fig. 1 shows that numerous EduTowns have been created under the EduCity portal website, each corresponding to an individual school. Furthermore, numerous EduVillages have been created within each EduTown, each representing to an individual class. Meanwhile, numerous EduCitizens have been created within each EduVillage, each corresponding to an individual learner. Additionally, EduHomes are created to bring parents, students and teachers into the network learning community. Moreover, EduSisterTowns are created from the alliances of two schools, and EduSisterVillages are created from the alliances of two classes. This multilayered educational service platform design was established based on majority user request, and the observation results demonstrate that this design can help to boost interactions among users (Chang et al., 2003).

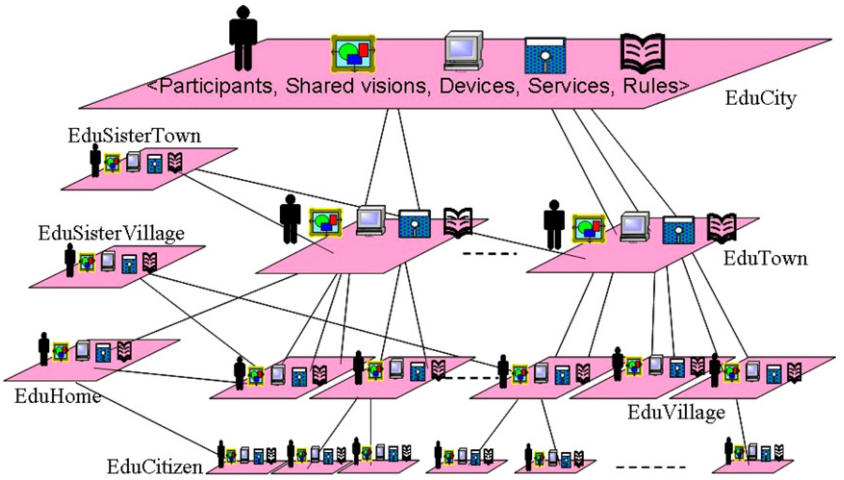

Fig. 1. Concept of a structured network learning society: EduCities.

Along with the building of EduCities, 10 basic elements, namely participants, shared visions, devices, services, rules, relations, manners, learning domains, learning goals, and learning activities, were identified as components of the structured network learning society, as described below.

2.2. Basic elements of a network tribal community

The basic unit of a structured network learning society is a network tribal community (NTC) which exists on the Internet. This section identifies five basic elements, namely participants, shared visions, devices, services, and rules, which are the essential elements for assembling a network tribal community.

Network tribal community (NTC) = ⟨P, V, D, S, U⟩
P: Participants
V: Shared visions
D: Devices
S: Services
U: Rules

These five elements have the following attributes:

2.2.1. P: Participants

Participants represent the lifeblood of any online learning group. The analysis of the network participants, as well as the interpersonal behavior of network community members, requires first identifying the participants. The term "role" is an extremely useful metaphor that is widely used in research and practice on human relations (Sarbin & Allen, 1968). This section applies some of the more widespread terms for describing network participants.

P (Participant) = {Role set, Description, Prescription, Expectation, Perception}

In a school-based tribal learning community, participants in a network tribal community can be P(teachers), P(students), P(staff), and P(principal).

2.2.2. V: Shared visions

Shared vision is the major factor used for grouping people both in real life and online. Shared visions in network tribal communities can be described using the following format:

V(Shared visions) = {Purpose, Purpose description}

2.2.3. D: Devices

Ubiquitous computing is possible (Norman, 1998), and fills different devices in our daily life environment. These devices include PDA, WebPad (Liu et al., 2003), Pocket PC, Table PC (Deng, Chang, & Chang, 2004), mobile phones, and information appliances. Different devices provide users with different opportunities to construct different network learning environments.

D(Device) = {Personal computer | PDA | Tablet PC | Mobile phone | Phone | Computer Server | and so on}

2.2.4. S: Services

Different users require different services. The network tribal community platform requires designing and implementing different software. This study considers these software and content as service items, and classifies them into different types and deploys them to different users. These service items included two basic elements, namely program and data. Content appears to be a service item under this assumption.

S(Service item) = {Name, Description, Program, Data}

2.2.5. U: Rules

Tribal communities involve a group of participants. Various rules are necessary for making communities work. System developers and members define these rules based on community properties.

U(Rule item) = {Rule name, Rule description}

As described above, these five basic elements, participants, shared visions, devices, services, and rules, are required to construct a basic network tribal community.

2.3. Basic elements of a structured network society

The Internet-based space contains thousands of network tribal communities. Based on the basic network tribal communities (NTC), two extra elements, R (Relation) and M (Manner), are added to create a basic structured network society (SNS).

Structured network society (SNS) = ⟨NTCs, R, M⟩
NTCs: Network tribal communities
R: Relation
M: Manner

The structured network society is based on numerous network tribal communities. These basic elements of a structured network society have the following attributes:

2.3.1. NTCs: Network tribal communities

As described previously, a NTC represents a network tribal community on the Internet. A structured network society contains numerous network tribal communities.

2.3.2. R: Relations

The relations are expressed as follows:

R = {NTCsource, NTCtarget, weight from NTCsource to NTCtarget, weight from NTCtarget to NTCsource}

The element R represents the relation between two basic network tribal communities. A relation includes four values. As demonstrated by the relation expression, NTCsource and NTCtarget are the two basic network tribal communities. NTCsource indicates the source NTC, and NTCtarget indicates the destination NTC. The third value used in the expression is the weight from the source NTC to the destination NTC, while the fourth value is the weight from the destination NTC to the source NTC. Fig. 2 illustrates an example of the structured network community concept with relation elements.

2.3.3. M: Manners

Manners are one of the basic elements for constructing a society. Manners are defined and modified by social members.

M(Manner) = {Manner list, Manner description}

2.4. Basic elements of a structured network society for learning

Three additional learning elements for learning purposes were added to the SNS in this section, and the SNS was extended for application to a structured network learning society. For learning

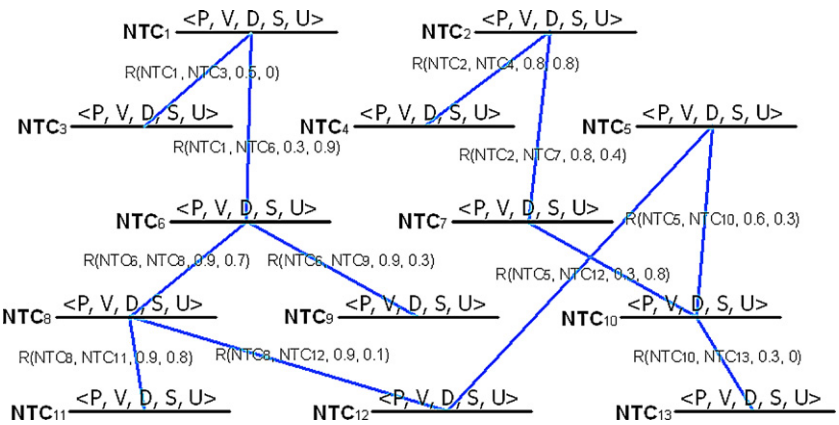

Fig. 2. Structured network community concept with relation elements.

purposes, three preliminary elements, O, G, and A, were added into SNS. Element O represents the learning domains, element G represents the learning goals, and element A is the learning activities. These three elements have the following attributes:

Structured network learning society (SNLS) = ⟨SNS, A(G(O))⟩
SNS: Structured network society
O: Learning domain
G: Learning goals
A: Learning activities

- SNS: Structured network society
  As described previously, SNS means a structured network society.
- O: Learning domains
  Learning domains indicate domains which were practiced in the SNS.
  O(Learning domain) = {learning domain description}
- G: Learning goal
  Learning goals are goals which the participants wish to achieve in the SNS in the specified domain.
  G(O(learning domain)) = {learning goal description}
- A: Learning activities
  Activities are learning activities that should be practiced to achieve the learning goal.
  A(G(O(learning domain))) = {learning activities list}

Various goals were established in different domains based on the structured network society. Furthermore, different learning activities are practiced to achieve each learning goal. Different learning domains, learning goals, and learning activities occur in different NTCs or among NTCs.

3. EduCities platform as a preliminary instance of a structured network learning society

3.1. A basic SNLS platform: EduCities

As described earlier, EduCities is designed based on a structured network learning society concept. EduCities comprises numerous NTCs, including EduCity, EduTown, EduVillage, EduCitizen, EduSisterTown, EduSisterVillage, and EduHome. EduCities is a network city designed for educational purposes (Chan et al., 2001). EduCities represents an infrastructure and a bare skeleton of a network learning society. Fig. 3 illustrates the relations of the NTCs involved in EduCities. All of the NTCs of the EduCities are described as follows.

3.2. NTCs in the EduCities platform

3.2.1. EduCity

EduCity is the portal of the EduCities platform, and users must pass through the EduCity portal first when using the EduCities platform. As shown in Fig. 3, the expression of the EduCity is as follows:

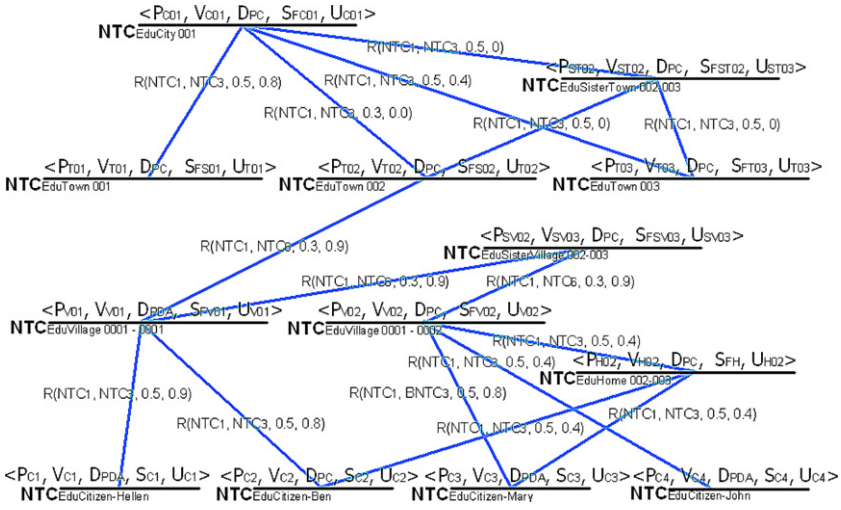

Fig. 3. Part of the EduCities platform architecture.

$$NTC(EduCity_{001}) = \langle P_{C01}, V_{C01}, D_{PC}, S_{FC01}, U_{C01} \rangle$$

- The participants (P_{C01}) in the EduCity NTC are those who are interested in using EduCity resources for learning. These participants included P(Parents), P(Teachers), P(Students), P(System operators), P(Government staff), P(Volunteers), P(Service items providers), P(Guests), and so on.
- The shared vision (V_{C01}) in the EduCity is to apply EduCity resources to improve student learning processes, and to facilitate student sharing of learning experiences and resources.
- A personal computer (D_{PC}) was the primary device used to access the EduCity online resources.
- Numerous software and content (S_{FC01}) are designed and disseminated as service items in the EduCity portal site.
- Learners must follow the rule (U_{C01}) of the EduCity. The rules are designed by the EduCity mayor, members, and system operators.

Numerous EduTown instances are created below the EduCity layer, as illustrated in Fig. 3. An EduTown is an online school-based learning environment.

3.2.2. EduTown

An EduTown is an online school-based learning environment. Each school can apply to own an EduTown by simply completing an application form. All application forms are processed by the mayor of the EduCity, who has the right to either accept or reject them.

Fig. 3 shows that the expression of one EduTown instance is as follows:

$$NTC(EduTown_{001}) = \langle P_{T01}, V_{T01}, D_{PC}, S_{FT01}, U_{T01} \rangle$$

- Participants (P_{T01}) in the EduTown001 are users who are interested in building their own school-based learning environment. These users belong to a school. A teacher, with a computer science background, can then apply to construct a mapping EduTown using the EduCities plat-

form. EduTown participants include P(Principal of the school), P(Staff of the school), P(Teachers of the school), P(Students of the school), and P(System manager of the school). The P(System manager of the school) should be a teacher with a computer science background, and is assigned the special title services as the "mayor" of the EduTown001. The mayor acts as a moderator and manager of the communities under their administration.

- The shared vision (V_{T01}) in the EduTown001 is the desire of all participants to build a school-based online learning environment and interact with other members via a Web-based learning environment. Shared visions differ according to EduTown, and members of individual EduTowns can define their own visions.
- In the school-based online learning environment, computers have numerous different roles. In the present case, personal computers (D_{PC}) are used to access the $EduTown_{001}$ resources.
- Numerous software and content services (S_{FT01}), which are named service items for schools, are designed and disseminated for the EduTown001.
- The operating rules are defined by the "mayor" of the EduTown. The members of the EduTown001 can give the "mayor" suggestions for modifying the rules. The "mayor" is the ultimate manager of the EduTown, and can determine which service items are acceptable in their EduTown. The "mayor" also has the right to accept or reject those wishing to join their learning communities.

Under an EduTown layer, numerous EduVillage instances are created as illustrated in Fig. 3.

3.2.3. EduVillage

K12 learners spend the majority of their time in classroom environments during weekdays. Numerous different strategies are required in classroom learning environments. The classroom metaphor is extremely useful for coordinating K12 learners. This section implements a Web-based learning environment, known as an EduVillage which corresponds to a real world classroom. As Fig. 3 illustrates, one of the expressions of the EduVillage is as follows:

$$NTC(EduVillage_{0001\text{–}0002}) = \langle P_{V01}, V_{V01}, D_{PDA}, S_{FV01}, U_{V01} \rangle$$

- Participants (P_{V01}) in the EduVillage NTC are users who are interested in establishing a class-based learning environment. These participants include P(class teachers), P(class students), and P(class system manager). The P(class system manager) is the original establisher of a mapping EduVillage. The P(class system manager) can be a teacher or student with a computer science background, and is assigned a special title, namely the "mayor" of the EduVillage.
- One of the shared visions (V_{001}) of the EduVillage is the desire to establish a class-based learning environment. The members of the EduVillage can cooperate to develop their shared visions.
- Numerous different devices can be used as communication tools. For example, personal digital assistant devices (D_{PDA}) are used as devices to access the EduVillage resources. Different devices can be applied in the EduVillage depending on user expectations.
- Numerous software and content services (S_{FV01}), named service items for classes, are designed and disseminated for learners in each class.
- The operating rules are defined by the "mayor" and the members of the EduVillage. The "mayor" possesses the ultimate authority to manage the EduVillage.

Each user in an EduTown can apply to join an EduVillage by completing an application form. The application forms are then forwarded to the ''mayor's office'', which is only accessible to the mayor of the EduTown. The ''mayor'' has the right to accept or reject any application.

3.2.4. EduCitizen

Fig. 3 shows an example of the EduCitizen expression as follows:

$NTC(EduCitizen\_{Hellen}) = \langle P_{C1}, V_{C1}, D_{PDA}, S_{C1}, U_{C1} \rangle$

- Participant(PC1) in the EduCitizen layer controls their personal learning environment.
- A common shared vision of the EduCitizen-Hellen is to build an effective individual learning environment. Different users have different visions regarding their individual learning environments. Users can define their visions independently.
- Several devices are used in the EduCitizen layer, for example PDA, PC and so on. Users can use a PC to login to their personal learning environment, or alternatively can use a PDA to access their personal resources.
- Numerous software and content services (S_{C1}), which are named as service items for citizens, are designed and disseminated for each learner.
- The operating rules are defined by the users, and are monitored by the mayor.

3.2.5. EduSisterTown

Fig. 3 shows that an EduSisterTown expression example is represented as follows:

$NTC(EduSisterTown_{002–003}) = \langle P_{ST02}, V_{ST02}, D_{PC}, S_{FST02}, U_{ST03} \rangle$

The EduSisterTown002–003 represents an agreement to create an alliance by EduTown002 and EduTown003. The EduSisterTown constructs a self-directed learning environment for the youngsters to enable them to be actively involved in learning via both formal and informal learning activities.

- The participants (P_{ST02}) in the EduSisterTown are from two different schools.
- A shared vision of an EduSisterTown is likely to create a self-directed learning environment for the youngsters to help them play an active role in learning via both formal and informal learning activities.
- Member interactions are supported by personal computer (DPC).
- Numerous software and content services (SFST) for an EduSisterTown are supplied to its members
- The operating rules are defined by the members of the EduSisterTown.

3.2.6. EduSisterVillage

The EduSisterTown mechanism is also applied to inter-class. The inter-class model is known as the EduSisterVillage. Fig. 3 illustrates an EduSisterVillage expression example, as follows:

$NTC(EduSisterVillage_{002–003}) = \langle P_{SV02}, V_{SV03}, D_{PC}, S_{FSV03}, U_{SV03} \rangle$

The $EduSisterVillage_{002–003}$ represents an agreement by $EduVillage_{0001–0001}$ and $EduVillage_{0001–0002}$ to form an alliance.

- The participants(P_{SV02}) in the EduSisterVillage are from two different classes.
- A shared vision of an EduSisterVillage is to construct a self-directed learning environment for youngsters to enable them to play an active role in learning via both formal and informal learning activities.
- Personal computers (D_{PC}) are used to support member interactions in the EduSisterVillage.
- Various software and content services (S_{FSV03}) for the EduSisterVillage are supplied to its members.
- The operating rules are defined by the members of the EduSisterVillage.

3.2.7. EduHome

The participants in EduHome include parents, teachers, and students. Fig. 3 illustrates an EduHome expression example, as follows:

$NTC(EduHome_{002\text{-}003}) = \langle P_{H02}, V_{H02}, D_{PC}, S_{FH}, U_{H02} \rangle$

- Participants (P_{H2}) in the EduHome include parents and their children. Furthermore, teachers also can participate in the EduHome.
- The shared vision (V_{H2}) of the EduHome is to use information technology to support the interactions among parents, students, and teachers.
- Personal computers (D_{PC}) are used to access the EduHome resources.
- Various software and content services (S_{FH}), known as service items for the homes, are designed and disseminated for learners belonging to each EduHome.
- EduHome operating rules are determined individually by the EduHome members.

3.3. Structured network society of the EduCities

As outlined above, the EduCities platform includes seven basic types of network tribal community, namely EduCity, EduTown, EduVillage, EduCitizen, EduSisterTown, EduSisterVillage, and EduHome. Numerous online tribal communities were established based on these basic types of network tribal communities. Among these online tribal communities, a management system is applied for managing the members. In the EduCity, a role named ''mayor'' is created for managing all of the tribal communities in the EduTowns network. The mayor of the EduCity possesses the right to create or destroy an EduTown. Once an EduTown is created, a relation automatically occurs. The system maintains the relation weight between each network tribal community. In the EduCities platform, each EduTown is created with the permission of the mayor of the EduCity. Consequently, these EduTowns most follow development criteria defined by the mayor of the EduCity and the members of each EduTown. The management system is also applied to the relation between EduTowns and EduVillages. Individuals wishing to establish an EduVillage must complete an application form and obtain the permission of the mayor of the EduTown. The mayor of the EduTown manages all the EduVillages which belonging to their EduTown. In this management system, each network tribal community contains at least a manager, plus a group of members. These members are managed by the manager(s) of the network tribal community. The managers of these network tribal communities are then managed by higher levels of management. Fig. 3 illustrates the management relations.

3.4. Learning activities in EduCities

Learning activities can occur within the network of thousands of tribal communities. For example, some EduCities citizens use EduCitizen as a platform to share personal reading experiences. EduCitizens upload their reading experience records to their EduCitizen platform, which is a personal website, and invite other members to visit and browse the contents. Furthermore, some learning activities can occur among network tribal communities. For example, the mayor of an EduTown may create an online course and ask the members of their EduVillages to participate in this course. Such learning activities can occur in the EduCity, EduTowns, EduSisterTowns, and so on.

4. Discussion

The EduCities platform has been established on the Internet (http://www.educities.edu.tw/ in Chinese). Numerous events have occurred and been observed in this structured network learning society. The authors have found the structured network learning society architecture design to be useful from many different perspectives, as follows.

4.1. Structured network learning society architecture design is beneficial to learners

According to the theory of "Structuration" of Anthony Giddens (Giddens, 1984), a duality of structure and actions exists. Structure simultaneously constrains and enables actions. Human actors thus not only follow rules, but also generally act creatively.

a. Structured network learning society is helpful in supporting users in their online roles execution. In a structured network learning society, the role, management scope, and activity relations are easier to identify and clarify.
b. The effectiveness of each network tribal community is easier to manage and evaluate. The network tribal communities in the structure network learning society are clearly defined, and identification and assessment of the network tribal community is simple.
c. Structured organization assists the dissemination of knowledge and the gathering of user feedback.
d. Shared visions simplify the establishment of a network tribal community because the network community members share the same background and common goals.

Another advantage of the structured network learning society design is easier community size control. Preece (2000) indicated that community size can strongly influence community activities. Too few people generate too little communication, making the community unattractive to newcomers. Too many people will create a sense for community members of being overwhelmed, or of not knowing anyone. Critical mass, the number of people required to make a communication system or a community useful, varies from community to community (Markus, 1987; Morris & Ogan, 1996). Structured network learning society design can easily improve control of community size by creating and destroying network tribal communities.

4.2. Hybrid physical and network learning environments

Networks are a good way to facilitate communication (Lazar, Tsao, & Preece, 1999). Network communities also effectively represent physical communities. Members of physical communities can use the benefits of the Internet to contact the people with whom they learn, live, and work, doing so on a daily and face-to-face basis. A hybrid community is being established that combines both physical and network learning communities (Chang et al., 2004). Physical learning communities, such as families, classrooms, schools, and work places, tend to be long lasting. During the study period, learners, especially K12 students, spend most of their time in these physical learning communities. Simultaneously, IT development recently has made network learning communities extremely successful (Preece, 2000; Rheingold, 2000; Wachter et al., 2000). Physical learning communities have strongly influenced network learning community evolution. In some situations, network and physical learning communities have been combined. Consequently, the boundary between physical and network learning communities is blurring.

Teachers and students are interested in establishing their own Web-based communities. However, physical learning communities continue to outnumber Internet based learning communities. Hybrid physical and network learning communities can enhance teacher and student interaction environments. The structure network learning society architecture helps users to integrate both network and physical learning communities. In the EduCities structure network learning society, system developers focus on establishing a high-usability system to help teachers and students establish network community-based learning environments. Furthermore, teachers and students using the system focus on operating a high-sociability learning environment.

4.3. Separate online learning society system designers and online participants

Online learning society design is a highly complex process. The process of online society establishment involves numerous experts in various domains. Online society design is roughly divided into online society system design and the management of online community members. Online society system designers attempt to provide high usability systems. Furthermore, the management goal of online community participants is to manage the usability of the online society system. The concept of a structured network learning society enables the separation of online learning society system designers and online participants. Online learning society system designers play a key role in designing a highly usable system, and online learning society participants play an important role in establishing a high sociability interactive environment.

4.4. Connected channels: Supply–delivery-analysis circle

The Internet provides a good environment for users to test the implementation of different ideas. The convenience of the Internet enables participants to easily produce content and software, and furthermore to disseminate this content and software to users. Users can easily receive content and software via the Internet. The Internet can be used to gather and forward user feedback to system developers. Furthermore, the observations of the authors regarding

the EduCities system indicated that it contained a circle called SDA (supply, delivery, and analysis) (Chang et al., 2003). Once a service items was created, the service item is dispatched to the users. Users then modify those service items. EduCities provides a multilayer platform for educational services. Researchers then can use this platform to release systems to participants based on user features.

5. Conclusion

This study outlined a concept known as the structured network learning society. In the structured network learning society concept, users can establish online social learning communities on multilayer platforms according to their own expectations. Users can extend a physical learning society by establishing an online social learning society that reflects it. Physical and online learning societies can be integrated. Compared to traditional network learning communities, structured network learning society architectures can more easily organize online learners, establish common shared visions, and facilitate learner interaction.

EduCities, which is an online structured network learning society, was established to test the concept of structured network learning societies. The EduCities system was established on the Internet for use by schools, classes, and individuals. Schools can establish school-based online learning communities based on the school level layer, named EduTown. Similarly, class-based learning communities can be established using the class level layer, named EduVillage. Finally, individuals can establish individual-based learning communities using the individual level layer, named EduCitizen. The different layers enable service item developers to provide different services. Based on the experience of developing EduCities, 10 basic elements, including participants, shared visions, devices, services, rules, relations, manners, learning domains, learning goals, and learning activities, were described and discussed. The 10 basic elements were identified based on the experiences of developing the EduCities system. Further theoretical exploration is required. These 10 elements are merely basic elements, and more elements will be identified in future studies.

Results of this study demonstrated that the benefits of a structured network learning society include the following: the structured network learning society concept more easily supports users in their online role execution; management and assessment of the layer instance becomes easier and more effective; structured organization helps in disseminating knowledge and gathering user feedback; shared visions are easier to build in layer instances; and structured network learning society design facilitates community size control. The proposed network learning society design is an online learning society model and represents an infrastructure, and a bare skeleton of a network learning society.

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Ben Chang received his Ph.D. degree in Computer Science and Information Engineering from National Central University, Taiwan, in 2003. He is a post doctor in Research Center for Science and Technology of Learning of National Central University, Taiwan. His current research interests are network educational game, network learning communities, devices supported classroom learning environment, and network learning platform design.

Nien-Heng Cheng received his master degree in Computer Science and Information Engineering from National Central University, Taiwan, in 2003. He is a Ph.D. student in the Department of Computer Science and Information Engineering, National Central University, Taiwan. His current research interests are online learning communities and computer supported collaborative learning.

Yi-Chan Deng received his master degree in Institute of Electronics and Information Engineering from Yun Lin University of Science and Technology, Taiwan, in 1999. He is a Ph.D. student in the Department of Computer Science and Information Engineering, National Central University, Taiwan. His current research interests are online learning community, mobile learning platform design, and decentralized online learning platform design.

Tak-Wai Chan received his Ph.D. degree in Computer Science from University of Illinois at Urbana-Champaign in 1989. He proposed the concept of learning companion system in his thesis. He is now the Chair of Graduate Institute of Network Learning Technology. His current research interests are mobile learning, active social learning models, and intelligent educational agents.