

# The Dialectic between Effectiveness and Humanity in the Era of Open Knowledge from the Perspective of Pedagogy

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## I. INTRODUCTION

**Abstract**—Teaching and learning should involve social issues by which effectiveness and humanity is due consideration as a guideline for sharing and co-creating knowledge. A qualitative method was used after a pioneer study to confirm pre-service teachers' awareness of open knowledge. There are 17 in-service teacher candidates sampling from 181 schools in Taiwan. Two questions are to resolve: a) How did teachers change their educational ideas, in particular, their attitudes to meet the needs of knowledge sharing and co-creativity; and b) How did they acknowledge the necessity of working out an appropriate way between the educational efficiency and the nature of education for high performance management. This interview investigated teachers' attitude of sharing and co-creating knowledge. The results show two facts in Taiwan: A) Individuals who must be able to express themselves will be capable of taking part in an open learning environment; and B) Teachers must lead the direction to inspire high performance and improve students' capacity via knowledge sharing and co-creating knowledge, according to the student-centered philosophy. Collected data from interviewing showed that the teachers were well aware of changing their teaching methods and make some improvements to balance the educational efficiency and the nature of education. Almost all teachers acknowledge that ICT is helpful to motivate learning enthusiasm. Further, teaching integrated with ICT saves teachers' time and energy on teaching preparation and promoting effectiveness. Teachers are willing to co-create knowledge with students, though using information is not easy due to the lack of operating skills of the website and ICT. Some teachers are against to co-create knowledge in the informational background since they hold that is not feasible for there being a knowledge gap between teachers and students. Technology would easily mislead teachers and students to the goal of instrumental rationality, which makes pedagogy dysfunctional and inhumane; however, any high quality of teaching should take a dialectical balance between effectiveness and humanity.

**Keywords**—Open knowledge, dialect between effectiveness and humanity, pedagogy, critical thinking.

### A. A Brief Background: An Author's Concern for Open Knowledge

OPEN education refers to using information communication technology (ICT) to open the gate for knowledge learning and sharing. On the one hand, there are many studies on instructional technology and its influences on education. These studies emphasized on technology and argued that technology determines how open education developed [6]. On the other hand, comparing with studies focusing on hardware and software, issues and challenges such as teaching and learning, especially for the professional activities in online learning are less studied [36]. Open education put an emphasis on both teachers and students, which encourages them to share and express their knowledge and thoughts in order to co-create knowledge together. This is not the skills of teaching, but teachers' attitude and value about pedagogy and education, in particular, in such an open knowledge era with the booming of information technology [29].

Technology development cannot limit knowledge creation, though ubiquitous learning is as pervasive as the bombing development of ICT. Instead, knowledge creation should look into the culture and social aspects rather than mere technology effects [29], [34], [45]. The social activities and interaction among teachers and students are an important part in knowledge producing within a technological environment as well [13]. Teaching and learning in open education are not only limiting to an aspect of technological usage, but involves social issues, especially concerning the interactive relationships among teachers and students by which they share thoughts and knowledge together, and they might co-create knowledge as well [34]. That is the reason why the relationship between teaching and learning effectiveness and its nature of humanity should be clarified as a guideline for both teachers and students when sharing and co-creating knowledge and in such a rapid development of the technology learning environment. Further, as social constructivism mentioned that cultural and peer group influence learning effectiveness, individual's confidence as an autonomous person becomes the significant factor to their performance in particular, in such an open knowledge era with the booming of information technology [28].

Except for the rapid development of technology having regard as a supporting element to open education, one should

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recognize that the main philosophic idea about the “openness” of knowledge is quite complex. “Openness” is an enduring and seductive ideology of the 20th Century--a modernism referring to “truth, knowledge, reality” and that which lies hidden yet governs our behaviors and even the way of thinking [39], which is against the nature of pedagogy or education, and lead us the iron cage of instrumental rationality.

#### *B. The Significance and Challenges of Open Knowledge Today in Such a Ubiquitous Era*

The difficulties for teachers to co-create knowledge with students lie in the fact that there's never been anything like the internet before. There are now 163 million people with email addresses which give them the potential for almost instantaneous communication with each other. It is estimated that within eighteen months the numbers will exceed 300 million [4]. We are at the point that we can foresee a time when the whole of the world could eventually be in instant communication with each other [9]. Everybody feels threatened by the Internet in some ways because it's so new, growing so fast, and it offers a whole new way to communicate, though it does bring us a lot of convenience both in daily life and education. Big media organizations that currently dominate radio, television and newspapers feel directly threatened as it is a market and the medium they do not understand, do not know how to make money out of or how to manage it. National governments, both liberal and authoritarian, are also worried as they are used to being able to control the flow of information and cannot do that very effectively when people are online. Obviously, the internet provides a new way for people to reach each other and share information [48] while it causes people living in jeopardy in a way during such an era.

Yet, open knowledge is just a kind of the new way, it occupies a unique niche in the teaching area with several reasons. First, in this new technology and media era, the new relationship among individuals has been reestablished toward peer-to-peer (P2P) relationship [28], while ICT has provided new ways of knowledge—production and equally respects to both teachers and students in education institutions [17]. Open education adopts ICT development and openness concept into education environments when inspiring teaching and learning performances. Open education encourages individuals to open to experiencing, open to criticism, and open to expressing with open-mindedness [40]. This is an essence of education to cultivate students with humane as a liberal person. Further, open education provides opportunities for both teachers and students to share and co-create knowledge. In other words, open education offers a new form of pedagogy to individuals achieving their learning outcomes by different methods, in particular, transferring the way of lecturing to student-centered pedagogy, based upon students' self-exploring and discourses to solve problems they faced. They learn that learning does not listen carefully to what teachers told, nor learning by heart, but learning by thinking, feeling, doing and pursuing new knowledge with a new wishing vision. What a great learning it

should be during such an open knowledge era.

Second, for openness to criticism, open knowledge makes scholars, teachers, students, and users take part in critiques and self-critical process. Recognizing the necessity of social interaction for knowledge production, Kant [24] argued in Critique of Pure Reason that human knowledge can be tentatively confirmed or negated only through processes of public submission and critique [19]. Without critical thinking, the reliability of knowledge produced through mass media seems to be challenging. Objective knowledge acquisition process requires different arguments and perspectives so that its participants (all teachers and students) may justify their argument and support the basic idea of openness to knowledge with sufficient evidences. While no-one could argue with desire to protect children online and the importance of boundaries, there are issues over how to do that and what appropriate technical and political solutions we implement. The core requirement should be to preserve the internet as a medium in which people can communicate freely whilst still protecting the rights of children and other vulnerable people, and the technology available today does bit meet that requirement, which might hinder the development of open education [47], [48].

The research project held by Taiwan Ministry of Education in 2014 showed that there are 16.5% (elementary school pupils), 28% (junior high school students) and 29% (senior high school students) belong to the potential group of the internet indulgence [32]. This report showed that pupils and students are engaged in the internet in their lives, both in the home and in schools, and such phenomena have caused teachers and parents worried about students' habits of communication and their eyes-caring. Also, it revealed that the development of ICT created a niche, but with a threat to others. This constitutes a challenge both for school teachers and parents, which is expected to solve. A quick solution for it is to enhance people's ability and disposition of critical thinking.

Third, open knowledge provides the freedom of academic activities. The freedom of individuals is subject to a wide range of conditions, including policies, laws, techniques of government and managing, administrative and financial systems, publishing regimes, academic hierarchies, and so on [31]. In socio-technical systems (STS) theory, work process combines both technical and social systems [34], [49], [50]. However, STS refers to the interrelatedness of social and technical aspect of an organization or the society as a whole, while the STS theory concentrates on the interactive relationship between individuals and their work by using social psychology [34].

As Luhman [30] defined, system theory as societal theory, and it is a system of communication defined by a boundary between itself (the interior system) and its environment (the exterior system) in a world. Communication limited within a system, on the contrary, communication goes over the boundary in the internet era. So, teachers and students need to express and interact with each other to conduct cooperative knowledge creation, that is, they can have their own

interpretation, self-expression, free speech, and all these activities above are tied to an openness of knowledge. Individuals with no ability to express themselves will hardly take part in an open learning environment. To express themselves and interact with each other, one must get used to the instruments of technology or internet platforms, such as, cell phone, Facebook, line, email and so on.

In such an open environment, both the content and the process by which it is created are equally visible, thereby enabling a new kind of critical reading. It seems likely that a great deal of informal learning is taking place both on and off campus via the online social networks. By enabling students to collaborate with working scientists, this movement provides a platform for the “learning to be” and ‘learning to be together’ aspects of social learning. The emphasis is on building a community of students and scholars as much as on providing access to educational content [6]. ICT has already had an impact on many sectors, especially education. However, while various new technologies have shown promise for education in the past, few have delivered on that promise, and many have disappointed [11], as previously stated. Moreover, the awareness of sharing community needs constructing instantly; communities should deliver knowledge to share with each other so that co-create knowledge becomes possible. However, there must be teachers who lead the direction to assure high quality and improve students’ capacity. In this condition, teachers are pressed and compulsory to face the challenge brought about by internet and internationalism. Therefore, teachers’ attitude about teaching and learning integrated with ICT becomes a key factor for the success of teachers’ empowerment and effectiveness of teaching and learning performance. Teacher training programs both for pre-service and in-service must meet with the needs to help teachers change their attitude with accurate and sufficient knowledge about ICT, including operating the teaching platform, managing media materials and adequate communication with students through the online networks, in particular, in such an open knowledge era.

## II. THEORETICAL FOUNDATIONS

### A. ‘No Child Left Behind Act’ Implies an Idea of Student-Centered Pedagogy to Meet with the Requirements of Students

After realizing the universal basic education, how to improve the quality of the it has become a crucial problem among educational policy makers and educational experts. On January 8, 2002, American President Bush signed one educational policy named No Child Left Behind (NCLB) [10], which marks the beginning of a new educational round. The main part of the bill was as long as 700 pages [37]. It has made the detailed stipulations ranging from the target setting, standards making, and the role of federal government in education reform and activities.

NCLB legislation [51] can be classified into 10 chapters (title I ~ title X), and each chapter includes some important projects. We can summarize its content as followings: a)

improving the disadvantaged students’ academic achievements; b) keeping training the qualified teachers and principals; c) providing extra teaching and learning for students with poor English or immigrant students; d) building schools with civic democratic literacy of the 21st century; e) offering parents more choices; f) assessing learning performance more flexibility and accountability; g) arranging proper education for Native Indians, Hawaiian and Alaska natives to meet what they need; h) subsidizing social welfare program (houses, land and other property etc.) and universal provisions; i) abolishing injustice and reauthorizing regulations with equality of rights. Besides, it reflects three characteristics [10]:

- a. Enhancing the government’s managing role and reallocating curriculum rights. This bill changed the state’s function towards local schools through to quantitative assessment to local education department.
- b. Facing to all and focusing on fairness. This bill aims at confirming all the children having a fair, appropriate and important opportunity to accept a high quality education. Open knowledge and ICT application are helpful to implement this policy and reach this goal.
- c. Emphasizing the basis of education. This bill stresses that the improvement of children’s reading ability is regarded as one of its main points.

NCLB Act regulates that schools should improve the quality of education, the teaching methods. Besides, it provides much more educational freedom for different states and districts in order to meet parents’ needs.

The NCLB Act reveals the student-centered pedagogical philosophy. Under this regulation, state should build one measurable teaching standard and one unified examination form to evaluate students’ performance, what’s more, teachers, principals, schools and school districts should be responsible for the improvement of students’ grades, in terms of engaging in students’ learning. On the opposite side of America, Taiwan and the Mainland China have also begun a new round of education reform at the same time [11]. The main purpose of this new curriculum reform is to build an open, vigorous curriculum system with Chinese characteristics with social justice, which aims at promoting students’ integrated development, viz., abilities of critical thinking, problem solving and creative transformation of knowledge. Based upon the innovation of educational policy, student-centered pedagogy is encouraged and multicultural is taken in consideration. Obviously, teachers’ professional development is strongly recommended, above all, self-reflection, theoretical discourses and practical teaching observations among professional communities.

### B. Constructivism Theory Unlimited Learning from S-R

Constructivism defines “knowledge as temporary, development, socially and culturally mediated, and thus non-objective” [5], and holds the view that knowledge must be constructed within the cognitive structure of every individual, so that it is fundamentally personal, in terms of autonomy, while being dependent on experiences in the learning

environment and on social interactions [27]. From the constructivist perspective, learning is not a stimulus-response phenomenon. It requires self-regulation and the building of conceptual structures through reflection and abstraction. Besides, concepts cannot simply be transferred from teachers to students—they have to be conceived [52]. Learning is a process of constructing meaningful representations, of making sense of one's experimental world [35]. Cognitive construction and social construction are two main approaches to constructivism. The former is associated with the work of J. Piaget and the later with that of L. Vygotsky [53], [54]. Cognitive constructivists focus on the importance of the mind in learning and development. Piaget used the terms accommodation and assimilation to describe the interplay of mind and environment in the learning process [16]. Learners use their cognitive structures to interpret the environment. In doing so, they assimilate new information into their existing cognitive schemas, understanding the information only to the extent allowed by the existing schemas. At the same time, the cognitive structures of learners change as they interact with the environment. The new information assimilated into the cognitive structures leads to the modification of these structures. Piaget views the cognitive structures as accommodating the environment. Thus, learning is an ongoing process involving continual interaction between the mind and the environment based on the development, an interaction which is never completed [12].

Social constructivism views each learner as a unique, complex and multidimensional individual with unique needs and backgrounds, and encourages the learner to arrive at his or her version of the truth, influenced by his or her background, culture, embedded by the world view and social interaction with knowledgeable members of the society [57]. Furthermore, the responsibility of learning should reside increasingly with the learner and emphasized that learners construct their own understanding with their self-awareness and those they do not simply mirror and reflect what they read, as A. Bandura [3] proposed in his social learning theory. Finally, sustaining motivation to learn is strongly dependent on the learner's confidence in his or her potential for learning from the actual level to potential level.

Walter Truett Anderson [1] once wrote the constructivist case in his book reality is not what it used to be as the following,

We are seeing in our lifetimes the collapse of the objectivist worldview that dominated the modern era, the worldview that gave people faith in the absolute and permanent rightness of certain beliefs and values. The worldview emerging in its place is constructivist. If we operate from this worldview we see all information and all stories as human creations that fit, more or less well, with our experience and within a universe that remains always beyond us and always mysterious. We honor the search for truth and knowledge and values, but regard what we find as the truth and knowledge and values of people-of people in our time [1].

This statement shows us clearly about the importance of

constructivism. With the guidance of this theory, we can figure out that pedagogy is first and foremost linked with teacher-and-student-oriented activity. In other words, teachers should take part in students' learning, instead of playing as a director, role model or even a dictator.

One of the founders of constructivism theory, J. S. Bruner put forth a theory of human development and a theory of instruction [7]. He hoped to create an educational environment with a focus on what was uniquely human about human beings [8]. Three stages about cognitive development to explain the effective learning was postulated as the following stages [8]. They are: a) The "inactive" stage of learning through actions; b) The "iconic" stage of learning by using models or pictures; and c) The "symbolic" stage of developing the capacity to think in abstract terms.

Pedagogy has long been pursuing these stages, while for constructivists, observations, objects, events, data, laws, and theory do not exist independently of observers [44]. Specifically, it is a process of integrating, which demands the learner to develop one's own understanding and teachers to be facilitators, and designer of teaching and learning environment compatible to students' cognitive experiences, and a promoter of free exploration and learning [55]. Furthermore, constructivist theory is constructed by both the teacher and learners together, so no knowledge is possible without a close co-operation among them: "trust and respect are synonymous with healthy relationship" [43]. This identifies that not only need knowledge co-create but share with each other and critical thinking plays as a role of reflection during discourse before reaching consensus. Since the different student has different characteristics; the construction of knowledge had better be designed according to the diversity of students. Teachers have to work together with students in a sharing and critical spirit [56]. As such, students would acquire self-confidence, be keen to work independently, know to enjoy and dedicate to learning. However, even many teachers who grasp this philosophy and support this trend, moving from theory to practice—sharing knowledge in an open education environment—is full of uncertainty. This article is trying to argue the importance of knowledge sharing to show the essence of characteristic in pedagogy, instead of emphasizing merely on effectiveness without humanity, based on grasping what influences pre-service teachers about the core idea of open knowledge, in particular in such an ICT trend 'invalidating' into the field of education.

## II. METHODOLOGY AND DISCUSSION

### A. Research Questions

We are using a short questionnaire as a pilot study to find out the knowledge about open knowledge of teachers. The data had been shown in the article published in *Computers in Human Behavior* [29]. The result indicated that willingness of using ICT of the teacher is the key factor influence pre-service teachers' concept about open knowledge, no matter whether expressing through face to face or ICT [56]. Furthermore, self-expression may play an important role for expressing

one's ideas and interact with others. This may influence social interaction in knowledge creation. Therefore, self-expression in both ICT and face-to-face environment may predict how one engages in open knowledge. In addition, open knowledge is a process to be critical of authority and tolerance of different ideas. In other words, self-decision with reflection constitutes the knowledge acquired and learning effectiveness. This result implies that learning effectiveness depends on self-regulation with thinking critically, and knowledge acquisition is not limited to listen to lectures, but interaction, thinking and doing or experiencing by the student himself or herself. In other words, the power of knowledge is no longer in hand of limited people but open to individuals [56]. Therefore, whether to follow the authority or not might depend on one's attitude of open knowledge. Last but not least, open knowledge is a knowledge sharing process so that willingness to share knowledge representing the attitude of open knowledge and further influencing the attitude toward e-education.

The data show that at present, teachers are well aware of that it is impressive to change their teaching methods to balance the educational efficiency and the nature of education for high performance in an open knowledge era. We would like to explore two questions in this paper.

- Question 1: How do teachers change their educational ideas to meet the needs of open knowledge, in terms of knowledge sharing and co-creativity?
- Question 2: How to balance the educational efficiency and the nature of education for high performance of teaching and learning?

In open knowledge era, the line between teachers and students is not clear. Students can be teachers occasionally and teacher needs to improve their teaching method as well. A teacher's willingness to admit problems in teaching practices will create a much more promising learning context for the students [42], as well as to express his ideas [46]. Reciprocally, the cooperating teacher will make a positive contribution to students' progress not only by expressing his knowledge through transparency, but also accepting that his teaching positions have been altered [21]. Under such circumstance, the student and his cooperating teacher are working together to generate new experiences in teaching and learning [41].

In this dyad of sharing of knowledge and know-how, students become teachers and the teacher become the cooperating partner. Kajs noticed that in exchanges following a series of mutual observations in class, the cooperating teacher himself may, in the same manner as the student, identify strengths and weakness in his own teaching and use this to improve his teaching method [23]. The mutual input requires a large amount of open-mindedness. Indeed, the cooperating teacher will be a more natural participant in this culture of knowledge sharing if he considers his student as a professional, encourages discussions and swap sessions, and adopts an egalitarian approach [46]. Further, the gap in expectation between the professional teachers and the learned students may be bridged via open-mindedness.

### *B. The Questionnaire for Interview and the Candidates Selecting*

Based upon the pilot study, this article worked out a semi-structured questionnaire of interviews to realize how teachers have developed their attitude toward integrating information technology into teaching and open knowledge, and the difficulties of e-education. 17 teacher candidates (nine males and eight females) who have been taught at either a primary or a secondary school for at least 10 year experiences and half of them major in information technology and the other half major in general subjects such as language, social sciences, mathematics, physics and biology. The reason why the author selected teachers with more than 10 years is because they are the teacher with teaching habits built and they have experienced a rapid change in dramatic technological development.

Each of them spent 40-60 minutes of interviewing six questions. Data were categorized into four groups to interpret their attitude of open knowledge, knowledge sharing and co-creating and e-learning, according to the pilot study. They are: knowledge, attitudes, difficulties and suggestions. During the interviewing, the interviewer kept no judgments and comments on whatever the interviewee said. The record must be approved by the interviewees before analysis and interpretation as triangle inspection. This semi-structured questionnaire for the interview has been approved by six professors in the field of education and/or ICT, in addition to 15 primary and/or secondary school teachers that have confirmed with the validity of the questionnaire.

### *C. Findings and Discussion*

First, diverse dimensions should add to the teacher's role, including a reassuring judge, a transmitter of information, a reflective practitioner, a collaborative member of learners, and a lifelong learner.

Both female and male teachers hold the same attitude toward open knowledge and e-education, no matter what their majors were. All of them think ICT is a helpful tool for students' enthusiasm and motivation for learning, and leading to higher performance learning. And, it also reduces teachers' energy for preparation and will also help teachers' professional growth. All of them agree that students should be the center of learning and teaching. Integrated with ICT in teaching is a kind of win-win strategies for teaching and learning nowadays, whereas some teachers are reluctant to accept it because it took too much effort to prepare for the materials [23].

No matter what the background of the teacher, ICT is a great tool for the teacher to effectively enhance their performance. Most teachers are willing to work with students to create the knowledge. However, it is not easy to using ICT easily, because they are not familiar with information technology, and solve any technical problems on website. If in the future the idea of flipped classroom and MOOCS is to be promoted, technical assistance should be provided. However, almost all teachers realized they need to be lifelong learners. However, three teachers out of seventeen pay some attention

to that teacher and student should be co-creator of knowledge, since teachers have more knowledge than students did. We also found that teachers from the informational field tend more integrated information into teaching as to help students' remedial teaching and learning and solve learning problems.

Most teachers do not think teaching is a dictatorship, but is a heuristic and inspiration for the students [20]. Teachers should appreciate students' achievement, and give positive feedbacks to the students' findings. Penlington believes that the most important role of the teacher is not evaluators or decision makers, and they should be at the equal status with the students to dialogue with students [38].

Traditionally, there is only teacher-based learning and face-to-face way in teaching and learning. However, in open knowledge, everyone can both create and judge knowledge, and also spread it [14], [15], [41]. Teachers were also required to enhance themselves, and act as a transmitter. Teachers although with their expertise, but also with their limits and imperfections [2], [26], and they are equal partners with the students. They need to engage in students' learning as a collaborator, being very different from an acting as a leader or an expert, which is like what Penlington [38] and Koschmann claimed [25]. In open education and e-education, teachers were required to have more interactions with students. In participating in open education with ICT, people need to be more active and interact with each other. The result indicated that more interactions between teachers and students, and online education are more effective, as Heinemann stated [18]. The success of open knowledge and e-education is that everyone is involved in open education and is willing to express or share their knowledge with each other. The environment for e-education is cooperative and creative. This pilot study indicates that self-expression contributes more to the model indicating the interaction of participants is crucial. Willing to share knowledge can be influenced by intellectual property protection and tolerance of different perspectives. These can either encourage or discourage the attitude of willingness to involve in open education activities and collective knowledge producing. Knowledge sharing is one important element of open knowledge and e-education, but more concerns may influence how one is willing to share. Teachers are expected to be more experienced and powerful in open education, as a result that students are drowning by mass knowledge. It is teachers who should burden the responsibility that help students equipped with enough knowledge and high quality both in academic knowledge and the open-minded mindset. Therefore, standing from the perspective of pedagogy, teachers are obliged to play as a role model of sharing and co-creating knowledge. Yet, what a teacher is expected to do is to realize each student's learning objectives and what they desire rather than just pursuit teaching speed, though teachers are always under the press of teaching tempo, according to the fixed teaching schedule. The key in open education is for the teacher to show how remarkable that knowledge is, and to motivate students to learn by themselves. Through the internet, teachers have many ways to interact with students, such as teaching in the synchronization

platform, Facebook and Line etc.

In order for the students to achieve high performance in e-education, certain aspects need to pay attention to. Although in open knowledge, students still need some basic common knowledge for problems solving and concept transferring in advance. Yet, this does not mean that teachers can play as a dictator to dominate knowledge. In contrast, teachers should be patient to lead students to acquire sufficient knowledge so that students will be able to discuss with teachers. More importantly, teachers should well prepare teaching materials and design teaching methods to meet students' needs, in particular, inspiring their learning interests and high performance. In this sense, e-learning may be a good way to inspire students' learning by their own exploring and collaboration with groups. Therefore, e-education served as a motor to initiate learners' motivation, to explore new knowledge. In this case, the idea of the flipped classroom and MOOCs provides the opportunities for learning ubiquitously. MOOC students learned a bit more than students in a traditional university course, but less than students taught with an interactive engagement pedagogy integrating technology with in-person instruction, according to a study released by MIT RELAT (Research in Learning, Assessing and Tutoring Effectively) group [33]. That is, effective learning and high performance must be shown from a discourse in which the interaction between teachers and students are encouraged, and the pedagogy is to inspire students to think critically.

Finally, teachers can establish their own website and online courses for better management in the teaching process. Since teachers know their own students better, they could set up websites and make plenty of course activity according to students' need. There are two purposes of this activity. One is that the students will receive the materials suits for them, and practice at their own convenience. Secondly, the teachers can balance effectiveness and the nature of education through the design of DIY courses, and they can integrate knowledge and humanity.

### III. CONCLUSION

Integrating technical tools or ICT into teaching is a challenge for teachers. The author argued for the dialectic between effectiveness and humanity in the era of open knowledge. Generally speaking, the universal use of open knowledge in e-education seems to be in the very near future trend in Taiwan. In fact, the Government in Taiwan has implemented the ICT policy in not only the primary and secondary schools, but in higher education. Further, ICT has become a more convenient tool to inspect and assess one's learning performances, and maintain an equal opportunity for each learner, as the NCLB Act showed. The Interviewing results for 17 teacher candidates have justified this fact. However, an unchecked technology would easily drive human beings to take instrumental rationality as the sole approach to reality, and to bypass the superficial effectiveness caused by a lack of concern to human dignity and human existence's meaning. The pedagogy with instrumental rationality might have made teaching and learning dysfunctional and inhumane

as seen in the use of ICT to foster literacy and agitate for the belief of the effective penance of ICT. And then the essence of pedagogy will draw away from self-regulated learning skills, thinking critically, and co-creating knowledge in the 21st century [22]. In a word, both teachers and students must be the masters, not a slave of technology.

There are 69 candidates (pre-service teachers) to take part in the pioneer study, and 17 teacher candidates (in-service) for the interviewing to show that pedagogy with open-mindedness may influence teachers' attitudes to open education. Further, their attitudes with critical thinking about open knowledge may influence their concept of knowledge sharing and co-creating. Obviously, teachers should act as a learning participant, a critical thinker, a transmitter of information, and a reflective practitioner in order to meet the needs of e-education in terms of knowledge sharing and co-creativity. Besides, for high performance pedagogy, teacher should enlighten actively students' intrinsic interests, make some reforms via emancipating themselves from fix standpoints, and then go a step further to establish the website, integrated e-learning with education.

Teachers and students seem conducive to the co-construction of theories adapted to a particular context of teaching and consequently, useful to each of them. Pedagogy integrating with ICT allows teachers and students efficiently apply computer resources and learning platform within and outside the classrooms, leading to substantially improved students' outcomes via self-regulation learning. However, morality, citizenship and humanity are hard to cultivate through ICT due to its spirit, inspiring coming more from the role model and constructive collaboration, as Lebow [27] and Portelance, & Durand defined [42], according to the theory of constructive cognitive learning.

In a nutshell, it is recommended that both in-services and pre-services teachers should combine interactive communication and critical thinking into their practice, which would activate a positive interdependence and will be a master while conducting e-education and encourage students to be brave to be and to express themselves

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