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The Foundation, Practice, and Challenges of the Intelligent Campus for Education

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This paper, trying to fulfill the possible research gap, discusses three aspects for the intelligent campus that educators need to consider. First, the new campus should be viewed as part of open education and open knowledge, in which the openness is extremely important when conducting the campus. Secondly, it should be practical enough to improve students' analytical learning. Next, the challenges of long-term development should be considered as it would involve data privacy and the digital divide. Educators are suggested to develop and design a curriculum more suitable and effective in the intelligent campus based on these aspects.

Keywords: intelligent campus, open education, open knowledge, learning analytic, digital ethics

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Introduction

The advanced digital technology has shaped our living and education today. Technology, human, and institution, are three important factors for a smart city (Kwok, 2015). Meanwhile, education is an important component and criteria when evaluating smart cities (Lombardi, Giordano, Farouh, & Yousef, 2012). Smart education can offer a dynamic learning environment for citizens to transform into smart laborers (Kwok, 2015) showing the importance of using a new form of education. Today, digital technology such as online services with emerging ubiquitous computing devices can track behavior to a greater degree than the past (Markowetz, Błaszkiewicz, Montag, Switala, & Schlaepfer, 2014) offering new ways for educators to build the campus and conduct teaching more effectively.

The intelligent campus (i-Campus) can serve as a model for modern school education because it connects resources and offers education opportunities with effective and efficient forms by using digital technology. This essay uses the term of i-Campus to represent all relevant topics integrating digital technology in schools, such as smart campus, digital campus, smart schools…etc. The i-Campus studies include supporting aspects of campus living such as environment, building, social live, healthy, governance, green campus, and management, while learning and teaching are the most study area (Muhamad, Kurniawan, Suhardi, & Yazid, 2017). I-Campus can use data efficiently to benefit campus service and management (Yang, Li, Ren, Liu, Han, & Liu, 2018). A study also indicate that the i-Campus may assist higher education teacher performance evaluation (Xu, Wang, & Yu, 2018). In fact, i-Campus may be used to support personal learning or adaptive learning with proper data usage (Kwok, 2015) or even conduct utilizing ubiquitous learning (Nelaturu, Kambham, Karna, Parupalli, & Mandula, 2010; Zhai, Dong, & Yuan, 2018). I-Campus is showing the possibilities for various forms of teaching and learning to enhance learning outcomes.

The i-Campus offers an advanced digital learning environment for both teachers and students. Digital learning environments have potential to improve autonomy, collaboration, personalization and creativity (McLoughlin & Lee, 2008) as well as learning-focused interactions and higher-level thinking skills (Grimes & Warschauer, 2008; Jesson, Mcnaughton, Rosedale, Zhu, & Cockle, 2018; Yang & Wu, 2012). Teachers can collaborate easier for effective teaching and analyzing students' learning. Curriculum design with digital technology may offer students

better personal learning opportunities. Therefore, i-Campus becomes a trend to improve quality of teaching and learning in a digital society.

The numbers of i-Campus studies increase 1.5 times every year between 2013-2017 (Muhamad et al., 2017). Although there are increasing discussions about the i-Campus, there are limited studies about the foundation of i-Campus which leaves a gap for the long-term development of the i-Campus. Furthermore, according to the *Educational Researcher* journal website description, the essay describes new developments of broad significance and direction of future development. Therefore, this essay tends to fill in the gap to discuss the theoretical foundation, practical methods, and the challenges of the i-Campus.

This essay discusses three aspects when discussing the i-Campus and implications for educators. The first theoretical aspect is the "open education and open knowledge" serve as the fundamental idea of i-Campus or digital education. To follow such an openness idea can integrate technology to improve education instead of being misled or restricted by technical issues. The second piratical aspect is taking the learning analytics (LAs) method as an example. It takes great advantage of digitalization and supports teaching on the i-Campus making teaching and learning more effective. However, the LAs may be ignored in some cases discussing the i-Campus. Last but not least, there are ethical concerns when discussing the challenge for the long-term development of the i-Campus. This essay offers two topics related to ethical issues. One is data sharing and the other one is the digital divide. The digital inequality issue affects both society and K-12 schools (Hohlfeld, Ritzhaupt, Dawson, & Wilson, 2017). These three aspects should be discussed when conducting curriculum development and teaching in the i-Campus.

The Theoretical Foundation of the i-Campus: Open Education and Open Knowledge

The concept of open education and open knowledge should be the core element of the i-Campus when developing curriculum and designing pedagogy. The i-Campus provides a better teaching and learning environment by using advanced digital technology. Open education and open knowledge offer interactive teaching and learning environment supporting the development of the i-Campus. The i-Campus can be viewed as a trend of open education development. Open education is providing educational opportunities and open knowledge for learners. Teachers

can teach students effectively and interactively in open education environments. This section includes illustrating openness ideas and arguing open education and open knowledge as the foundation of the i-Campus.

The Idea of Openness and Technology Development

Openness is an important idea in open education and open knowledge supporting the i-Campus. When discussing openness, it can use the "open system" to illustrate such an idea. The open system has some particular characteristics such as being holistic, interactive, and cybernetic while adjusting for feedback (Marion, 1999). It supports to open or cross boundaries conducting interactive relationship among different systems. The i-Campus makes an open system idea into reality. In an i-Campus, all stakeholders can interact with each other easily so that teachers, parents, students can interact to gain feedbacks. This can help to develop and adjust curriculum and teaching timely. Teachers can also cooperate to develop curriculum and share ideas resulting in knowledge-producing activities. Administrators can conduct the whole scope of strategic planning because the open systems offer administrators to consider both on-campus and off-campus conditions. This openness idea integrates with technology has changed the social and educational culture to open resources and opportunities.

Meanwhile, technology development also supports the i-Campus to use advanced technical systems to assist the administration, teaching, and learning. The technology infrastructures development can support the i-Campus. However, technology was not merely a series of mechanical improvements that impelled openness, but also profoundly influenced culture and societies. Both Heidegger and Foucault thought of technology as a means to reveal the truth and affect human subjectivity (Besley & Peters, 2007). Technology in Heidegger's thought is a process that revealed the truth with the unification of minds, fine arts, and human activities (Heidegger, 1977). Foucault followed Heidegger's perspective and extended it into concerning power relationships and the construction of subjectivity (Besley & Peters, 2007). Technology became composed more of biological characteristics and fewer mechanistic characteristics due to two reasons: First, technology's characteristics were simultaneously mechanistic and organic (Arthur, 2009). Second, technologies were acquiring properties that involved self-assembly, self-configuration, self-healing, and cognition that become resemble living organisms (Arthur, 2009). The technology should be considered more than a technique that involves social influence. The theoretical knowledge, the

collaborative work style, and the information technologies associated with government-sponsored research have become increasingly important elements of modern society (Turner, 2006). New forms of communication have decentralized concepts of identity, nationalism, and citizenship and changed how social interacts (Tukdeo, 2008). The information has been a central feature of democracies since early social modernized formulation (Peters, 2007). Political economy has changed as a result of the decentralizing influences that have been brought on by information production. (Benkeler, 2003). Gates (2006) used the term “Information democracy” to indicate the software development process to share free information leading to better knowledge management and changes in the relationship between information and democracy. Information technology has played an important role in social culture and can also influence campus culture. It encourages participants, such as teachers, students, or even parents to involve in learning activities. Teachers and students are using technology in search of truth and knowledge-producing. Openness ideas and technology can support open education and open knowledge that the i-Campus can be built on.

The Development of Open Knowledge and Education

The value of knowledge increases when it is considered as important influential stimulate and foundation for economic development (OECD, 1996; World Bank, 1998). The open idea refers to the freedom to use, reuse, and redistribute knowledge without restrictions (Molloy, 2011). Meanwhile, the free and open software also inspires many other initiatives sharing information and knowledge with the least restrictions. The Creative Commons founders, Larry Lessig, and some others launched the first version of the well-known licenses a year later as Open Publication License (Lin, Ko, Chuang, & Lin, 2006). In 2001, Wikipedia was founded while the Internet Archive Project was also active and became what people can access today (Thelwall & Vaughan, 2004). An important event for open knowledge movement at the end of 2001 is the Budapest Declaration giving birth to the Budapest Open Access Initiative (BOAI) by 2002. The “Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities” (Berlin Declaration) stated the open access with some standard digital forms easy for archiving and sharing can contribute to sharing complete scientific knowledge (Berlin Declaration, 2003; García-Peñalvo, García de Figuerola, & Merlo, 2010; Harnad, 2005). Furthermore, the Directory of Open Access Journals was established in 2004 to provide an open access database for thousands of journals influencing many important publishers to provided open-access later on (Bailey, 2005). These

contributions offered the foundation for open knowledge as an easier sharing of knowledge and opportunities for collaborative knowledge production. Open knowledge contributes to the i-Campus by encouraging the knowledge should be open and value collaborative knowledge-producing.

Open education resources by using Information communication technology (ICT) with non-profit purposes usage for users is becoming popular (UNESCO, 2002). Open education as a form of open knowledge has been adopted by many other institutions (Wiley & Gurrell, 2009). For example, starting from 1999, the Massachusetts Institute of Technology (MIT) initiated MIT OpenCourseWare (OCW) to share all course material by internet free and open to all users. The "Cape Town Open Education Declaration" (CTOED) also claimed to promote open education resources as well as including using all kinds of technology and teaching methods in education (CTOED, 2007). CTOED showed the cooperating of open education resources with ICT to achieve the efficiency of open knowledge.

Open education has become associated with distance education using ICTs to ensure to make educational resources available to all individuals regardless of location (Peters, 2007). Open education involves commitments of openness and freedom that are derived partially from historical and political frameworks and beliefs about educational modernization that developed during and after the Enlightenment (Peters & Britez, 2008). Tunnell (1975) characterized some rules for open education, such as respecting students' choices, teachers creating a rich educational environment, individualized instructions, and respect to students. Geser (2007) also defined open education with access to open content with free, for re-used for educational activities, and available sharing open code to share resources. These characteristics also become the core ideas of the i-Campus. In the i-Campus, education resources and opportunities should be open to teachers and students.

The i-Campus involves openness and freedom of knowledge sharing, teachers creating rich learning activities, and individualized learning. It requires a mind shift toward openness, technology, and active collaboration to overcome challenges today (Benson & Filippaios, 2019). The concept of open education and open knowledge provide a guiding idea for the i-Campus. When designing the i-Campus, it is ideally providing educational opportunities and open resources for students by using ICT. It offers flexibility and individualized learning model for students. The sharing and collaborative knowledge-producing characterized the i-Campus from traditional schools. Teachers and students can interact easier and produce knowledge together

in the i-Campus.

The openness idea and advanced technology can lead to the culture of open education and open knowledge. The advanced technology makes learning, teaching, and interact easier. The i-Campus is rooted in open education and open knowledge to offer educational opportunities and resources to learners. Moreover, i-Campus creates a knowledge sharing and collaborative knowledge-producing environment for teachers and students. Teachers in i-Campus can cooperate to develop curriculums and conduct collaborative teaching activities due to the openness culture. Students can also learn either with teachers or peers through ICT. In short, open education and open knowledge provide i-Campus theoretical foundation. When conducting curriculum development, teaching, and learning activities in the i-Campus, educators should integrate open education and open knowledge ideas. The i-Campus can offer teachers to design curriculum collaboratively and gain feedback to adjust and improve teaching. Therefore, students in the i-Campus benefit from open education and open knowledge to enhance their learning.

A Practical Approach of the i-Campus: Learning Analytics

LAs can be a practical approach for the i-Campus. This is because the advantage of the i-Campus is to combine advanced digital technology improving teaching and learning activities. LAs are important methods that truly shows the potential of using digital technology to enhance education. LAs integrate big data with algorithm analysis to offer educators more information about students so teachers can take proper actions. This provides teachers and students with better teaching and learning experience. However, the i-Campus curriculum developers and teachers sometimes forget to take advantage of digital technology to use LAs. The definitions of LAs are varied from using student-generated data for predicting educational outcomes to adjust education (Junco & Clem, 2015; Xing, Guo, Petakovic, & Goggins, 2015) to help educators to examine and support students' study behaviors or change their learning (Drachsler & Kalz, 2016; Rubel & Jones, 2016). LAs can also refer to measure, collect, analyze, and report data about learners and their contexts for understanding and optimizing learning activities and the learning environments (Long & Siemens, 2011). LAs can provide learners and learning information for modeling, predicting, and optimizing (Ferguson, 2012; Mah,

2016; Viberg, Hatakka, Bälter, & Mavroudi, 2018). The main goal of LAs is to extract students' learning behaviors to further improve teaching and learning quality (Huang, Lu, Huang, Yin, & Yang, 2019). In short, LAs collect and analyze students' behaviors digital data for teachers to predict students learning outcomes and improve their teaching quality. Therefore, LAs can be used to increase the quality of education by identifying individual learning behaviors and learning problems.

Since the i-Campus is using digital technology to enhance education affairs, the LAs should be the main strategy of conducting the i-Campus. There is a growing interest in LAs as a fast-growing and multiple-disciplinary of Technology-Enhanced Learning (TEL) method (Viberg et al., 2018). The i-Campus should take advantage of technology to raise the quality of education. The i-Campus can use LAs when conducting curriculum development and pedagogy design. LAs can improve TEL by offering analysis and prediction for teachers to take the next step to adjust their teaching and improve students' learning outcomes. Predicating students' online learning outcomes can be done by collecting learning track log data using single classification technology (Hu, Lo, & Shih, 2014). LAs can identify target course, improve curriculum, benefit personalize learning, improve instructor performance, assist post-educational employment, benefit LAs practitioners, improve student learning outcome, behavior, and process (Avella, Kebritchi, Nunn, & Kanai, 2016). This can lead to a better learning experience and outcomes of students.

The data collection and analysis are the foundation for LAs while methods may be various. For example, in a reference model for LAs, researchers identify some methods for LAs, including statistics, information visualization, data mining, and social network analysis (Chatti, Dyckhoff, Schroeder, & Thüs, 2012). Users are revealing their personal preferences and behaviors in online activities becoming part of the data (Puschmann & Burgess, 2014). For predicting students' learning outcomes, the grade level (Villagrá-Arnedo, Gallego-Durán, Llorens-Largo, Compañ-Rosique, Satorre-Cuerda, & Molina-Carmona, 2017) or passing the class or not (Hu et al., 2014) may be useful predictors. LAs can help teachers, students, and administrators to make decisions based on evidence (Conde & Hernandez-Garcia, 2015). Therefore, teachers can provide different teaching methods to help students to overcome possible learning challenges. The LAs can also embody the ideal of the i-Campus to improve student individual learning. For example, if students who fail in a pre-test may predict they may have problems learning the next part of course. Teachers can provide remedial teaching, adjust teaching methods, or materials to help each student to prepare for the following courses.

When the i-Campus uses LAs in practice, teachers may offer interventions to help students overcoming learning challenges when they can identify at-risk students in advance. LAs can help teachers, students, and administrators to make decisions based on evidence (Conde & Hernandez-Garcia, 2015). To start with, to identify at-risk students is the first important task in LAs (Kuzilek, Hlosta, Herrmannova, Zdrahal, & Wolff, 2015). These data can be gain from students' previous learning information or continuous data gathering in the semester. The LAs can analyze existing data while educators can classify some indicators to identify at-risk students. From the students' backgrounds, previous learning data, and current learning conditions, the indicators that educators set can trace and identify those who are struggling in their learning. Teachers can further assist those students who encounter challenges. The LAs can offer possible suggestions for teachers to assist their students to adjust their learning behaviors (Huang et al., 2019). Teachers will be able to act to help or improve students' learning on the i-Campus. LAs can be used to predict and classify students' performance, especially to those at-risk students. LAs can help to identify knowledge gaps, modified curriculum, better teaching strategy, measures appropriately for targeted learners, and monitor students' activities (Reyes, 2015). LAs may also analyze students' learning behaviors such as spending how much time reading or practicing math. Teachers can find some methods to support students to spend more time or be motivated in learning. Teachers can use data from LAs to understand how students are performing and improve their learning outcomes.

The i-Campus curriculum development and teaching should include LAs when designing courses. Teachers can analyze students' performances and improve teaching quality and learning outcomes in the i-Campus when using LAs. LAs can identify individual learning problems to provide feedback for teachers and students. Teachers can base on the feedback to offer individualized remedial teaching. Teachers can also use LAs to understand students' learning conditions and adjust their teaching methods and process. Both teachers and students can collaborate by using LAs to improve learning activities. LAs can enhance students' learning experience, outcomes, and become a practical method of conducting the i-Campus.

The Challenges of the i-Campus Development: Ethical Concern

The i-Campus uses digital technology to achieve effective and efficient campus management and teaching activities. It is using the technology and methods, such as ICT, Big Data, cloud computing, and LAs, in curriculum and teaching to make the i-Campus to superior traditional schools' operation. However, there are some challenges that educators should also concern when conducting the i-Campus development. In this essay, two important issues are presented, namely Data sharing and the digital divide.

Data Sharing

One of the main challenges of the i-Campus is related to the data issue. For more precise, it is the data sharing and connecting issues because of the privacy concern. The data sharing enables administrators to gain data to make decisions and operate their work effectively. Teachers may also need data to understand her/ his students, and combining LAs, to assist their students' learning. Teachers also use data to provide learning resources and even an individualized learning model based on data analysis. The utility of data, especially the Big Data, is a key for the best use of digital technology.

Data sharing and connecting may encounter privacy issues. When the i-Campus works, it relies on using data to make intelligent decisions and management. Therefore, some challenges related to Big Data may also apply in the i-Campus. The main value of Big Data is capable of searching, aggregating, and cross-reference data (Boyd & Crawford, 2012) to gain in-depth understanding or analysis. Meanwhile, it can also identify small patterns and connections in large datasets (Floridi, 2012). The i-Campus uses data analysis and connecting to make administrative and teaching work effective and efficient. However, the advantage of the i-Campus is based on the utility of data that may have privacy concerns. Individual privacy can restrict the usage of data that may limit the i-Campus potential development. Administrators and teachers may need to consider to what degree of information and data can be shared. If a student transforms into a different school, can her/ his previous data be shared? Or only partly shared with administrators and teachers of the new school. Do the teachers have the right to access important data related to personal information that someone might not like to expose, such as Attention Deficit and / Hyperactivity Disorder (ADHD)?

More regulations and ethics should offer practical guidelines for the i-Campus. Therefore, the regulations and ethical codes of data utility need to be discussed. Stakeholders should be invited to discuss how to make the best out of the data while protecting individual privacy. The collaboration among schools and how to set regulations to protect such collaboration can benefit the overall development of the i-Campus.

Digital Divide

The i-Campus is based on digital technology development and ubiquitous devices. This may lead to another ethical concern is the inequity problem. The most direct related inequity challenge of the i-Campus is the digital divide. Not every student has access to the Internet outside of a school. Not every student has proper devices access to learning materials and interact with other peers or learning communities. Education researchers are interested in topic of students' experience of using digital technology in or out of school as an important issue promoting equitable social and economic opportunities (Hohlfeld et al., 2017; Judge, Puckett, & Bell, 2006; Purcell, Heaps, Buchanan, & Friedrich, 2013; Warschauer & Matuchniak, 2010).

The digital divide is a crucial issue when discussing educational inequity and the i-Campus. The main reasons for inequality are the socioeconomic disparities due to unequal distribution of economic resources, lack of opportunities to build human capital, and unavailable social resources (Carter & Reardon, 2014) that now involves digital inequality. The digital inequity can be viewed as a form of social inequality that has differences in technology access, skills and use have implications for human, social, and financial capital (Hargittai & Hsieh, 2013) while larger issues such as race, sex, class, and language can be worsened by factors associated with the digital divide (Gorski, 2009). Different SES students may use software vary, for instance, low-SES students may use more for computer-directed activities including, drill and practice or remedial work; while high-SES students use more for student-controlled activities including creating with or communicating through technology (Hohlfeld et al., 2017).

In the past, the definition of the digital divide was mostly about access to the Internet, but the digital divide is more complex than that. The digital divide can be dynamic and involves various motivations, skills, and usage (Van Dijk & Hacker, 2003). Three-level factors may influence the digital divide, namely, political and

economic factors at the societal level, cultural and social factors at the community level, and personal factors at the individual level (Yu, 2006). The digital divide may relate to SES. Schools may only provide instructional support if the majority of students from Low-SES while schools with more Hight-SES students may foster the development of higher-order thinking skills (Reinhart, Thomas, & Torskie, 2011). One main advantage of the i-Campus is to use digital technology to make learning more effective and individualized. However, the digital divide may restrict some students to encounter such learning possibilities. The important part of the digital divide is how ICT impacts the quality of life (Kim & Kim, 2001).

Students may experience three levels of the digital divide in school and these levels are hierarchical that an equitable outcome at each level may support students having equal participation in the next level (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; Hohlfeld et al., 2017). The first level is the infrastructure within schools that include access to hardware, software, the Internet, and technology support within schools, grounds equity in ICT between schools of differing SES (Hohlfeld et al., 2008; Hohlfeld et al., 2017). In reality, schools meet the crucial condition offering technology access may encounter challenges of upkeep costs, pressure from policymakers and the media, return on investment (ROI), and legal or ethical issues (Lim, Zhao, Tondeur, Chai, & Tsai, 2013). The recent studies show that schools utilize mobile technologies to reduce the gap in SES but result in new trend gaps between socioeconomic advantaged and disadvantaged students (Zhang, Trussell, Tillman, & An, 2015). The inequalities can be caused by the cost of mobile services, income, income distribution, shared financial investment, and competition the defines the mobile digital divide (Weiss, Gulati, Yates, & Yates, 2015). The new mobile technologies have stronger connectivity, bandwidth capabilities, and increased opportunities to access the software through digital distribution platforms can only increase the importance of using digitalization and raise concerns of the digital divide (Dolan, 2016).

The second level is in the classroom level showing how technology is integrated into the instructional process in the classroom (Hohlfeld et al., 2008; Hohlfeld et al., 2017). Teachers instruct students on how to use technology and work with others. When students participate in various instructional activities with both hardware and software applications, they acquire their digital skills and progress their ICT capacity (Alexander, 2003). The goal of the second level is to support students to have the digital capacity for the next level (Hohlfeld et al., 2017). The second-level of the digital divide may result from first-level access factors (Hawkins

& Oblinger, 2006; Hohlfeld et al., 2017). Moreover, schools with more Low-SES may employ less credentialed and less experienced faculty whose perceptions of technology literacy of their students may not respond to the population reality (Warschauer, Knobel, & Stone, 2004)

The third level is using technologies to empower individuals within a school context (Hohlfeld et al., 2008; Hohlfeld et al., 2017). The ultimate goal of level three is achieving the goal of public education producing citizens fulfill their dreams and contribute to society by engaging productively and successfully in a global digital world (Hohlfeld et al., 2017). In other words, the third level aims not only memorizing basic knowledge but more critical and creative learning as empowered individuals.

In the i-Campus, administrators and teachers should understand the digital divide within their school and class. The policymakers should also consider the digital divide issue and offer resources to reduce inequity challenges. There are some initiatives can be done. First, the government and not-for-profits organizations or even industries can work together to provide infrastructure and devices for students and schools. More resources can be provided to those students and schools to equip them to engage in the i-Campus. Second, teachers should be aware of inequity and digital divide problems. Teachers can understand the challenges their students have when learning in the i-Campus. Thirdly, the professional development community for teachers may be needed. Teachers can further develop and design their curriculum and teaching to reach different students overcoming digital divide challenges. For the i-Campus to benefit all students, the digital divide is an unavoidable challenge that needs to be overcome. Teachers should also design curriculum and teaching while considering the digital divide issues.

Implications and Conclusion

This essay provides three aspects of the i-Campus to show the educators what the i-Campus is rooted, how to improve the i-Campus in practice, and what is needed to develop the i-Campus. The discussions of i-Campus in this easy can guide educators to develop and design a curriculum more suitable and effective. The i-Campus using advanced technology on campus management and pedagogy may enhance teaching and learning. The first section of the essay is to clarify open education and open knowledge as basic ideas supporting the development of the

i-Campus. The i-Campus can make education more inclusive and conduct collaborative knowledge-producing. The i-Campus based on open education and open knowledge ideas can offer teachers and students an effective and efficient learning campus. Teachers can collaborate with each other for curriculum design and teaching while students can have access to various educational resources.

The second section of this essay argues to use LAs as a practical approach when conducting the i-Campus. LAs can fulfill the need of the i-Campus to analyze data to improve the quality of teaching and learning. LAs can further assist teachers to identify students' learning conditions and diagnose their problems. Teachers can take the next step to help each student to overcome their learning challenges so that students can have better learning outcomes. The i-Campus can also make personalized learning possible by teacher designing curriculum supporting individual learning and using ICT.

The third section of this essay argues two challenges of the future development of the i-Campus. This section points out the challenges from data ethics and the digital divide may restrict the development of i-Campus. Educators can follow open education and open knowledge idea when developing curriculum and teaching. Teachers can use LAs to support their teaching in the i-Campus. Educators should be aware of data privacy and digital divide issues when executing the i-Campus.

This essay tends to provide i-Campus developers and stakeholders with the theoretical foundation and practical suggestions. The i-Campus is a developing concept and practice that takes advantage of technology for managing the campus, developing curriculum, improve teaching, and enhance learning outcomes. This essay provides some key ideas and elements of the i-Campus for educators. There are various ideas and practical methods about conducting i-Campus that can be further discussed and explored in future studies. Infrastructures and regulations of the i-Campus are also related important research topics can be studied. More practical case studies and empirical researches can be conducted to improve the i-Campus in the future.

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智慧校園教育的基礎、實踐與挑戰

劉子彰

本文討論了教育工作者需要考量智慧校園的三個面向，用以補足智慧校園研究上所缺乏之處。第一，是智慧校園的基本思維。智慧校園可以看作是開放教育和開放知識的一部分。建構智慧校園時，需要重視開放概念思維。第二，是對智慧校園的實用建議。智慧校園的一個主要目的是改善學生的學習，而學習分析應該是實用的方法之一。第三，是智慧校園長期發展的挑戰，它涉及數據隱私問題和數位落差議題。這些可以指引教育工作者在智慧校園中開發和設計更適合和有效的課程。

關鍵字：智慧校園、開放教育、開放知識、學習分析、數位倫理

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