

# Academic Information System Support in the Era of Education 3.0

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**Abstract.** The emergence of Education 3.0 as a new paradigm in education has been spread widely in many educational institutions, especially in higher education institutions (HEIs). Many of them have been implementing the new paradigm and get benefit from it. But somehow, the implementation caused some problems. The new policy and procedures are causing administrative problems, especially in the academic affair. The implementation also needs to provide external involvement. To overcome the problems, the academic information system (AIS) can be used to support the characteristics of Education 3.0. The purpose of the research is to find the possibility support from the AIS to the characteristics of Education 3.0. The research used Education 3.0 concept and information system (IS) concept to find the possibility. The research used a case study as the method and conducted a qualitative research with an unstructured interview. After comparing the Education 3.0 concept and IS concept with the interview analysis, the research found that all the characteristics of Education 3.0 can possibly support by the AIS. The result can be used as a guideline to develop the new AIS with the capability to support the characteristics of Education 3.0.

## 1. Introduction

As part of information system (IS), academic information system (AIS) was largely implemented in many higher education institutions (HEIs) [1]. They used AIS to help them in manage academic affairs. Most of the HEIs only used AIS for administrative purposes [2]. But on the other hand, the HEIs also used the AIS to support their decisions maker [1]. With current technology, the AIS can be used to support another purpose such as Education 3.0.

Education 3.0 is a new paradigm in education world [3]. Its characteristics made learning process wider. The role of academic stakeholder has changed. Technology usage more advanced and the learner status also extended [4]. The AIS must be enhanced to support the characteristics.

### 1.1. Background

The teaching characteristic in Education 3.0 was more connected with technology. They use e-learning technology to produce and share knowledge. Mostly, HEIs implemented e-learning using a ready-to-use application such as Moodle LMS, Edmodo, etc [5]. Some of the HEIs also develop their own e-learning application. Those applications not only can support learning activity but also can support evaluation activity. Assignment, assessment, scoring, and marking processes are also provided by those applications. However, because those applications are separated from the AIS, the evaluation



results can not automatically show in the AIS [6]. The lecturer must key in it manually into the AIS because most of the HEIs just developed the AIS for the academic administrative purpose [7]. The whole characteristics of Education 3.0 can see in Table 1.

**Table 1.** The characteristics of Education 3.0 [8].

<b>Education 3.0</b>	
Meaning is ...	Socially constructed and contextually reinvented knowledge
Technology is ...	Everywhere (digital natives in a digital universe) for ubiquitous knowledge construction and transmission
Lecturing is done ...	Lecturer to student, student to student, student to lecturer, people-technology-people (co-construction of knowledge)
Institutions are located ...	Everywhere in the “creative society” (thoroughly infused into society: cafes, bowling alleys, bars)
Parents view education institutions as ...	Places for students to create knowledge, and for which parents may provide domestic, volunteer, civic, and fiscal forms of support
Lecturers are ...	Everybody, everywhere, backed up by wireless devices designed to provide information raw material for knowledge production
Hardware and software in schools ...	Are available at low cost and are used purposively, for the selective production of knowledge
Industry views graduate as ...	As knowledge-producing co-workers and entrepreneurs who can support the development of focused knowledge construction

Furthermore, [9] found accessibility problems when the application did not support mobile platform. Besides that, the mobile platform provides an ideal way for the exchange of knowledge which will enhance the students' absorptive limit when joint effort is utilized in the learning process [10].

The accessibility also can help parents of students to involve in their children learning activity. Most of the adults already have smartphone or tablet PC as their mobile device [11], they can use that device to monitor their children's activity. Considering most of the time that students spent in HEIs with their lecturers [12], parents at home or at work can involve to the learning activity through the mobile device.

After parent involvement, there is another stakeholder involves in Education 3.0 characteristics. The characteristic is industry involvement. Mostly, industry and HEIs already collaborated in strategic levels such as research, knowledge transfer and curriculum development [13]. But at the operational level, such as recruitment, the collaboration happens after students graduated. The industry gets information about students' achievement after they graduated [14]. Ideally, the industry also can involve in their learning process. Industry can access students' portfolio and achievement during the semester, or they can be reviewers in the related assignment. With those, the industry can select prospective candidates early before they graduated. To do so, the industry must be active in the system.

### 1.2. Problem statement

Everyone is a learner and learning can be anywhere and anytime are some of the characteristics of Education 3.0 [8]. Those can be facilitated by implementing e-learning/mobile learning/blended learning. A study by [6] has found that the implementation of e-learning and AIS in separated application causing administrative problems. Research by [9] also found accessibility problems when the application did not support mobile platform.

The Education 3.0 characteristics also talk about parent and industry involvement in education [8]. However, most of the existing AIS was only used for the administrative purpose and only support

users from the internal of the institutions [1, 2]. The involvement of parent and industry did not support yet.

### *1.3. The aim of research*

This paper aims to find the support possibility from the AIS to the implementation of Education 3.0 in the HEI.

## **2. Literature review**

### *2.1. Academic information system*

Academic Information System (AIS) is software to help process the academic data of an educational institution. AIS in higher education institutions (HEIs) are generally used to handle the student academic data starting from registration, plan their study and to look at the study result. Most of the HEIs use web-based AIS connected to the intranet or the internet [2]. The study mentioned the AIS only used for the administrative purpose. The users of AIS from this study only student and administration staff.

From [1] study, AIS refer to a set of systems and activities that are used to organize, to process, and to use information as a source within an HEI. The output of the information resulted from this system will deliver information to the leaders or the decision makers that can be categorized in different utilization and different purposes. AIS in this study not only used for the administrative purpose but also used by leaders of the institution to help them make a decision for institution development. The AIS used by students, lecturer, administration staff and executive.

An academic information system has to cater to the needs of students, faculty and administrative staff [15]. The study compares the AIS in three different HEIs. The study found that AIS mostly have same procedure and function. Hence, they also suggested AIS must be flexible to development. This helps the system to remain up to date and provides better functionality with changing technology and needs of the users.

From the facts above, current use of AIS in higher education institutions mostly for administrative process and support the decision maker. The current users also limited to lecturers, students, administration staff and executive leader.

### *2.2. Education 3.0*

Education is a complex process. In education, there are five elements: teacher, learner, subject matter, context, and evaluation. Those elements must be integrated constructively to effect high levels of meaningful learning. The meaningful learning will lead education to empowerment for commitment and responsibility [16]. It demands the very best from parents, teachers, students, and administrators collaboration and technology can help the collaboration.

According to [17], education has always been awash with new ideas about learning and teaching. Teachers and administrators are regularly bombarded with suggestions for reform. They are asked to use new curricula, new teaching strategies, and new assessments. In the digital age, all those processes can be supported by technology [18].

To achieve collaboration in education, the use of technology becomes compulsory. When technology is implemented and integrated appropriately, they have an opportunity to learn about that technology by using it as a part of their learning. The education for empowerment by [16] and education in the digital age by [18] are played in a new approach to education. This new approach called Education 3.0. Education 3.0 means a rich, collaborative learning experience focused on authentic, project-based learning. Students and teachers should have access to materials, formative assessments and each other “anytime and anywhere,” and be able to draw in experts from around their system or around the world at the touch of a button [3].

According to [4], Education 3.0 is characterized by rich, cross-institutional, cross-cultural educational opportunities within which the learners themselves play a key role as creators of

knowledge artifacts that are shared, and where social networking and social benefits outside the immediate scope of activity play a strong role. The distinction between artifacts, people and process become blurred, as do distinctions of space and time.

In Education 3.0, students are empowered to produce, not only to consume the knowledge [19]. As in Figure 1, Education 3.0 is made possible by Education 2.0 which is internet-enabled learning, and by centuries of experience with memorization in Education 1.0. Education 2.0 begins the transition to a new educational paradigm based on knowledge production and innovation production, the appropriate engines for viable 21<sup>st</sup>-century economies. Education 3.0 is qualitatively different incarnations that build upon Education 2.0 information sourcing capabilities and, to a lesser extent, the memorization habits of Education 1.0 [8].

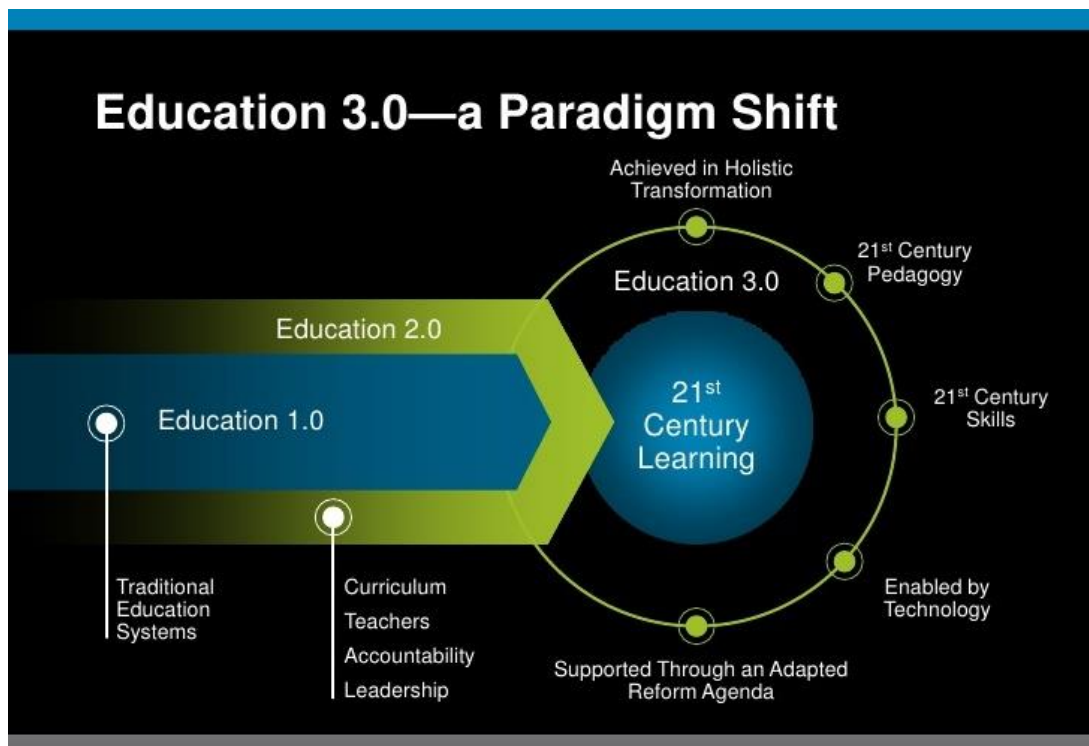


Figure 1. Education 3.0 paradigm [3]

### 3. Methodology

This research will be qualitative and used case study. Primary data obtained through unstructured interview and secondary data obtained from the documentation and publication. The research used Sistem Informasi Akademik Universitas Langlangbuana (SIak UNLA) in Bandung, Indonesia as a case study. Case study method good for investigating a contemporary phenomenon in depth when the boundaries between phenomenon and context are not clearly evident [20]. In this research, the Education 3.0 is a contemporary phenomenon and the AIS in the HEI is a context. This research interviewed lecturer, student, parent, and industry. The documentation of SIak UNLA used for known its specifications, procedures, and functionalities. The collected data will be analyzed and compared with the characteristics of Education 3.0 and the information system concept.

## 4. Analysis and Discussion

### 4.1. Analysis of interview data

The teaching characteristic in Education 3.0 was more connected with technology. They use e-learning technology to produce and share knowledge. From the interview with some lecturers from institutions that used e-learning, they shared some problems when used e-learning and AIS in the separate application. They also used social media and instant messaging application to enrich their learning process. Because of those, they must spare more time to calculate the final results because they must combine and recap from electronic-based and paper-based marks. When all marks are recapped, then they must input the final results to the AIS. They also often late to submit the final results when they handle more subjects or classes. The on time accomplishment of the final results is one of the performance indicators in higher education institution [21]. If many lecturers late to submit the final results, it will be affected to the institution's accreditation.

Besides with the lecturers, the interviews also are done with some students. These students used various e-learning. They used Edmodo, Moodle or their own institution's e-learning. Moodle, Edmodo, and others e-learning application have been used by many HEIs [5]. The HEIs used the application because of it simple to install and supported mobile platform. For Edmodo and Moodle users, they very helped with the mobile platform services. They can access the e-learning from their mobile device anywhere and very enjoyed with the push notification function. But when they accessed the AIS with their mobile device, they felt the lack of function on it. They lost some information and function because the AIS did not support mobile platform yet. This also happens to the users that used their own institution's e-learning without mobile platform support. Furthermore, [9] found accessibility problems when the application did not support mobile platform. Besides that, the mobile platform provides an ideal avenue for the transfer of knowledge which will improve the students' absorptive capacity when collaboration is used in the learning process [10].

The accessibility also can help parents of students to involve in their children learning activity. Most of the adults already have smartphone or tablet personal computer (PC) as their mobile device [11], they can use that device to monitor their children's activity. Considering most of the time that students spent in the HEIs with their lecturers [12], parents at home or at work can involve to the learning activity through the mobile device. From discussion with some parents, they are not only curious about the final results in every end of the semester, they also curious to what their children do and learn to achieve the results. In the other's hand, they do not know how to do that and where to access. If they get the access, they can more involve to their children education and also give values to their social live.

Besides parents, there is another stakeholder involves in Education 3.0 characteristics. The characteristic is industry involvement. Mostly, industry and HEIs already collaborated in strategic levels such as research, knowledge transfer and curriculum development [13]. But in operational level such as recruitment, the collaboration happen after students graduated. The industry gets information about students' achievement after they graduated [14]. Ideally, the industry also can involve in their learning process. Industry can access students' portfolio and achievement during the semester. With those, the industry can select prospective candidates early before they graduated. But somehow, the industry also did not have access to do that.

The number of organizations with a dedicated campus recruitment strategy has increased by a whopping 25% since 2013. They choose it because of the cost effectiveness. With the evolution of human resource (HR) into a strategic partner in the growth and performance of an organization, the challenges faced by the HR workforce have also changed. Engaging and retaining top talent are one of the biggest challenges [22]. No matter how fast people run, they can significantly improve the ability to cover long distances in relatively shorter time when they use a vehicle. The same goes for hiring. Technology can help to scale the efforts, make it significantly faster and eliminate human biases. The insight an experienced interviewer can bring to the table can become even more powerful with the right tools [23].

Based on the facts above, for the HEIs that have implemented Education 3.0 characteristics in their learning process are suggested to support those characteristics with their ICT capability. Especially for HEIs that already used e-learning or mobile learning or blended learning and also for those who already implemented student-centered learning, the supporting becomes a priority to overcome the current and future problems.

#### 4.2. AIS and Education 3.0

As we know AIS is an information system for the academic purpose. The components are used in AIS will be same with IS components. The components of IS are hardware, software, database, procedures, people, and network. The hardware is a device such as a processor, monitor, keyboard, and printer. Together, these devices accept data and information, process them, and display them. The software is a program or collection of programs that enable the hardware to process data. A database is a collection of related files or tables containing data. A network is a connecting system (wire-line or wireless) that permits different computers to share resources. Procedures are the set of instructions about how to combine the above components in order to process information and generate the desired output. People are those individuals who use the hardware and software, interface with it, or use its output [24, 25].

The IS components can be used to relate the AIS and the Education 3.0. However, there are lacks of studies focusing on the relationship between the AIS and the Education 3.0. But there are some researches about implementing IS in education. Research by [26] used IS to manage of education performance. Research by [27] implemented IS to manage academic record. IS also used for activity collaboration in the HEI [28]. All above researchers used whole IS components and fits it to the related needs. Based on the facts, this research will use IS components and the characteristics of Education 3.0 to find relation possibility between AIS and Education 3.0.

The eight (8) characteristics of Education 3.0 can be possibly related to IS components, therefore the supporting possibility from AIS to Education 3.0 can be shown in Table 2.

**Table 2.** The supporting possibility from AIS to Education 3.0.

<b>The characteristics of Education 3.0</b>	<b>Information System Components</b>
Meaning (socially constructed)	procedure
Technology (everywhere)	hardware, software, database, network
Lecturing	procedure
Location (everywhere)	hardware, software, database, network
Parents involvement	people
Lecturers (everybody, everywhere)	people
Industry involvement	people
Hardware and software	hardware, software

As seen in Table 2, support from AIS to Education 3.0 can be proposed from the possibility. In Table 1, the meaning of Education 3.0 is socially constructed and contextually reinvented knowledge. To implement this characteristic, HEI must create new policy and rule to construct learning environment same as in the meaning of Education 3.0. This implication cannot be avoided when an organization implementing something new such as concept, procedure, or technology [20]. From IS components overview, the support will come from procedures. New procedures for AIS are needed to create to support the meaning of Education 3.0.

The characteristic of technology in Education 3.0 is everywhere (digital natives in a digital universe) for ubiquitous knowledge construction and transmission. To support this characteristic, HEI

must aware in using the right and latest technology. Technology has impacted on educational practice in education [29]. From IS components overview, the support will come from IT infrastructures (hardware, software, database, and network).

The characteristic of lecturing in Education 3.0 is lecturer to student, student to student, student to lecturer, people-technology-people (co-construction of knowledge). To support this characteristic, HEI must backup it with the code of conduct to avoid miscommunication and misunderstanding between lecturer and student. Code of conduct can clearly state the rights and obligations between lecturer and student [30]. From IS components overview, the support will come from procedures.

The characteristic of learning location in Education 3.0 is everywhere in the “creative society” (thoroughly infused into society e.g. cafes, bowling alleys, bars). To support this characteristic, HEI must facilitate it with proffer technology. E-learning becomes a major role in this characteristic. E-learning used for delivering well-designed, learner-centered, interactive, and facilitated learning environment to anyone, anyplace, anytime by utilizing the attributes and resources of various digital technologies [31]. From IS components overview, the support will come from IT infrastructures (hardware, software, database, and network).

The next characteristic is parent view education institution in Education 3.0 as places for students to create knowledge, and for which parents may provide domestic, volunteer, civic, and fiscal forms of support. A preliminary study found that parents not only curious for the final results in every end of the semester, they also curious to what their children do and learn to achieve the results. In the other’s hand, they do not know how to do that and where to access. If they get the access, they can more involve to their children education and also give values to their social live [32]. From IS components overview, parents are one of people component.

The characteristic of lecturer in Education 3.0 is everybody, everywhere, backed up by wireless devices designed to provide information raw material for knowledge production. This characteristic means learner can learn from anybody, but it doesn’t replace the formal lecturer. In Education 3.0, there are informal and formal lecturers. The informal lecturer can be anybody and any sources and formal lecturers are the lecturers from the institution [19]. From IS components overview, lecturers are one of people component.

The characteristic of hardware and software in Education 3.0 are available at low cost and are used purposively, for the selective production of knowledge. Usages of hardware in Education 3.0 are must be effective and efficient to prevent the high cost. Usages of software are encouraged to use open source software. This characteristic is concerned to encourage education institutions with the limited budget, so they can implement Education 3.0 [33]. The hardware and software also part of IS components, then the supporting will be in-line with the characteristic.

The last characteristic is industry view graduates as knowledge-producing co-workers and entrepreneurs who can support the development of focused knowledge construction. To support this characteristic, the HEIs must provide an access to students’ portfolio and achievement during the semester for the industry. Therefore, the industry can involve in the learning process and select prospective candidates early before they graduate. Mostly, the industry gets information about students’ achievement after they graduated [14]. From IS components overview, the industry can be one of people component.

## 5. Conclusion

Based on analysis and discussion, this research has found that all the characteristics of Education 3.0 can be supported by AIS. For the HEIs that have been implementing the Education 3.0 concept, they can use their AIS to support the characteristics, especially in technology-based. The integration of e-learning and AIS, mobility access, and also parent and industry involvement can be supported by IS components. The support hopefully can solve the administrative problems, the lack of mobility support, and the external involvement. For further research, suggested to detail the new functionalities and features, also find the suitable framework to guide the transformation of AIS to support Education 3.0.

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