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Technological Readiness of the UAE Higher Education Institutions for the 21st Century

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Abstract

Educational institutions are considered as main indicator of a nation's competitiveness and the excellence of implementing their goals and objectives increase a nation's sense of competitiveness. Thus, it is important to receive a progress report showing how close the educational institutions are in accomplishing the 21st century visions and goals. The aim of this study are to investigate how ready the educational institutions for the 21st century, identify 21st century tools that are used in the three educational institutions, examine the abilities of students to learn from any where any time and study the type of assessment tools which are practiced in the educational institutions. 235 instructors participated in the study from three United Arab Emirates educational institutions. The results indicate that there is relatively change in the average scores for all three measures.

Keywords: educational assessment, assessment tools, technological readiness, 21st century readiness, lifelong learning, school effectiveness

1. Introduction

21st century is defined as a century of developing knowledge based digital information technologies and economics (Dzubinski et al., 2012; Lai, 2011). Things have started to appear differently as we have entered a new era. Such changes include the democratization of governments, structural shifts in production and the proliferation of value systems. On top of that the changes have shown on people attitudes and behaviors as they are more interactive with the technology. These changes carry out serious challenges and higher education plays a major role to meet these challenges by continuing to make progress through innovation, effective adjustments, planning and vision. Educational institutions are not only a place of knowledge, technological innovation and culture; nevertheless they are centers for building competitive nations and arm them with 21st century skills to embark and be part of the economic development journey of a country (Binkley, Erstad, Herman et al., 2010). Educational institutions are considered as main indicator of a nation's competitiveness and the excellence of implementing their goals and objectives increase a nation's sense of competitiveness. Thus, it is important to receive a progress report showing how close the educational institutions are in accomplishing the 21st century visions and goals.

Technology is a compelling mechanism to facilitate learning of content and applied skills, and its use will be instrumental in realizing every aspect of 21st century education system (Bridges, 2000; Vockley, 2008). The use of technology simplifies the students to develop 21st century skills. 21st century skills do not focus only on the technological literacy but they include proficiency in critical thinking, problem solving, communication and team work (Paige 2009). Although critical thinking and problem solving remain salient assets for learners and career seekers, they are given new dimension in the 21st century via advanced technologies for accessing, analyzing, and creating information (Trilling and Fadel 2009).

The current status of education is no longer supporting many educational institutions to reach their visions and goals. One of the most vital obligations of any society is to prepare young adults for 21st century to be ready in leading productive and prosperous lives as adults. This means that all students should have good foundations of

numeracy, literacy and thinking skills due to be well prepared to take responsibility for their career development (Monks, Conway and Dhuigneain, 2006) and lifelong learning (Stefania, 1998; Fastreab et al., 2012).

Goodman and Beenen (2008) introduced and demonstrated how an organizational learning contract leads to enhance learning in a college or university setting by a sharing an agreement between students and agents of the educational institutions. In addition, this tool offers for both faculty and students the opportunity to assess progress on the learning outcomes which vary from one course to another. In many educational settings, this contract helps not only to assess the effectiveness of educating students but also to be clear on defining the learning objectives and the systems needed to assess the learning activities/outcomes, redesign of education and assess accountability.

Sitzmann, Ely, Brown and Bauer (2010) discussed how self-assessments could offer the possibility of minimizing the burden of designing/developing time-consuming tests to find out whether a particular knowledge has been attained. This investigation focuses on three key issues: 1) compare self-assessments with affective and cognitive learning outcomes; 2) identify, if any, the relationships between self-assessments with cognitive learning; and 3) use and interpret self-assessment of knowledge in evaluation research.

This research indicates the importance in preparing the students for 21st century and promoted the best uses of technology to make sure that the students have access to a teaching and learning environment that will make them ready to compete globally and lead the world in innovation. In addition, it shows if the educational institutions initiate to conduct learning in a blended learning environment. Furthermore, it provides educational institutions feedback on how close they are in accomplishing their goals and visions.

This study will also assist the education community such as higher education institutions, educators, students and parents to understand the role of technology in facilitating 21st century education for the improvement of United Arab Emirates future. It would also benefit Ministry of Higher Education and Scientific Research which plays a major role in education field and supports the education community to move forward and raise the bar on education. It would provide the higher education institutions a report showing how close their institutions are to achieving the 21st century visions. Thus, this study would help to know not only if students are ready for the 21st century but also if they are able to reach the stage where they can take full responsibility and deal with problems professionally and effectively.

1.1 Definition of Terms

Higher education Institutions: United Arab Emirates University, Higher Colleges of Technology and Zayed University.

21st Century Skills: Four broad categories which are ways of thinking and working, tools for working and skills for living in the world:

- Ways of thinking: Creativity, critical thinking, problem-solving, decision-making and learning.
- Ways of working: Communication and collaboration.
- Tools for working: Information and communications technology (ICT) and information literacy.
- Skills for living in the world: Citizenship, life and career, and personal and social responsibility.

STEM:	Science, Technology, Engineering and Mathematics
ICT:	Information and Communication Technology
CBA:	Computer-Based Assessment
PD:	Professional Development
UAE:	United Arab Emirates
UAEU:	United Arab Emirates University
HCT:	Higher Colleges of Technology
ZU:	Zayed University

1.2 Limitations of the Study

This work included only the three public higher education institutions in United Arab Emirates, therefore the research focused on three educational institutions: United Arab Emirates University, Higher Colleges of Technology and Zayed University during the academic year 2012 - 2013.

2. Literature

2.1 Program Effectiveness

Lowther, Inan, Ross, & Strahl (2012) examined the effectiveness of one of the programs which could assist the students to maximize their 21st century knowledge and skills. The program was called Freedom to Learn (FTL) which focused on teaching practices and student learning. The laptop computers were used in this program while improving their skills and learning. The purpose of this study was to define the strategies that the teachers used when integrating laptop computers into the classroom, the teachers and students attitudes toward using technology in the classroom and the students' performance in using FTL program. Survey and observation are the methods used to gather accurate data and receive beneficial results. The effectiveness of FLT program was measured using the Formative Evaluation Process for School Improvement/Tech Package which contains different methods to collect data such as classroom observation, surveys, student performance assessments and school developed technology benchmarks. 90 of 195 schools participated in this research and the results indicated that the teachers who were involved in the study showed more confidence to integrate technology into the classroom and the students moved forward to achieve 21st century knowledge and skills.

The 21st century has begun and made quick changes to many things in our lives such as social and technological change. These changes have influenced on adults and many have scrambled in order to meet the complexities that characterize their daily lives. Research shows that adult learners are faced with multiple challenges at work, education and family. Therefore it needs adult education graduate programs to define the best way to meet these changing needs of today's students. Different group of stakeholders in adult education were asked about the role of their education institutions in assisting adults, organizations and society meet the demands of 21st century life. This work revealed that adult education has to include and design dynamic graduate programs which could support the cultivation of critical and timely reflection, create online learning environments and center the relationship between adult learning and development capacity due to prepare adult education facilitators who stand surely in the face of complexity (Dzubinski, Hentz, Davis & Nicolaides, 2012)

Curtis Boehmer (2011) studied the impact of technology on the cognitive learning of the children. The researcher believes that video game has been an effective element in education and has now been accepted to assist students to think, find solution to problems and overcome difficulties. Video game provides students practice and over learning. Accordingly it develops their skills. The researcher used BrainWare Safari program which is designed to develop students' underlying mental processing skills. A group of students used the program for ten weeks. The outcome of the study showed that the program built students skills, perceived unique skills on them that they were not aware about and gave them the opportunity to experience learning with the foundation that needed for success.

2.2 Educational Changes and Challenges

Mingaine (2013) examined the importance of ICT in teaching and learning and how the leaders could play a big role in executing it in their educational institutions and motivate the instructors putting into practice. Leadership in technology is an essential aspect to lead in implementation of ICT in the institutions. The researcher studied the difficulties that the leaders faced through the execution of ICT in public secondary schools, Kenya. A descriptive survey used to gather data and it was distributed to 105 public secondary schools in the country. The researcher received 315 respondents from ICT teachers, principals and Board of Governors (BOG) chairpersons. The findings showed that principals who are considered as the school leaders who lead the school community count on government and partners to provide them with the equipment that would build the ICT infrastructure. The researcher recommended that school leaders should make sure to assign good budgets for ICT to implement it.

The researchers examined the use of ICT in two groups, students who have difficulty learning in a typical manner and students who have not. ICT considers as a key to overcome the challenges that cause by learning disabilities (LD) and assist LD students to improve their academic work. The research evaluated the use of ICT and learning opportunities between the two students groups who come from English and French language colleges. 196 students participated in the research, 74 who have LD and 122 who have not. An online survey was completed by the students to find out the answer. The significant findings of the study is that students with LDs

used less ICTs than students without an LD, the LD students used the general ICT which are not specialized for LD students. The study also indicated that the students from English and French colleges have different experience. The researchers recommended that ICT should assist all the students, therefore colleges should provide ICT technology fairly between student with LDs and without by offering varieties of ICT tools. (Fichten, Nguyen, King, Barile, Havel, Mimouni, Chauvin, Budd, Raymond, Juhel & Asuncion, 2013)

Hossain & Robinson (2011) studied a critical concern in the US which showed that the students, teachers and practitioners are not prepared in the fields of science, technology, engineering and mathematics (STEM). Although the US government and institutions set dynamic action plan to increase the number of experts, it still can not produce enough number of experts in these four fields in order to meet national and global needs. The educators and legislators face challenges to achieve US education goals because of this situation. The US has good numbers of English teachers for every job, but it struggles to find qualified mathematics teachers (Golden 2009). The causes of the situation is the increase in student enrollment, teachers have more workload, high responsibility, low wages and the integration of technology into the classroom (Woullard & Coasts, 2004).

With a 2020 vision, Bybee (2010) claimed that the education sector has to advance STEM education in the United States in order to respond the challenges faced by the nation. This vision suggests that it is the time to think out of the box and look at STEM literacy as priority thing to be included in education. STEM has to be defined clearly and what it means for educational policies, programs and practices because it might mean different things for contemporary education. Five different definitions for STEM were presented to assist educators in understanding the concept of STEM literacy and the benefits that could bring to the education. The purpose of STEM education in school programs was better clarified and started to be referred to the PISA 2006 Science frame work (OECD, 2006) which explained the conceptual understandings and procedural skills and abilities for individuals to address STEM related personal, social and global issues. Consequently, STEM education needs to be associated with a 2020 vision as it will respond to contemporary challenges that the nation faces now and during the next decades.

2.3 21st Century Requirements: Tools and Skills

Digital technology is an effective tool to assist managing the changes in education field. Educational institutions have to implement the required changes in the curriculum and teaching practices due to respond to the demands of globalization and prepare the students with 21st century skills and competencies. Lai (2011) illustrated how the digital technology would support higher education learners to build and improve their 21st century skills. Many changes are needed to be taken in consideration which would influence on the learners positively and the impact of digital technologies on teaching and learning. One of the ideas proposes that if digital technologies are used as participatory communicative tool to support collaboration and build structure of the knowledge, as well as enhance the quality of teaching and learning (Merrink et al., 2010). This study also indicated different learning characteristics and how vital it is that learners should be aware of their own characteristics. Realizing the blending of formal and informal learning strategies in higher education is also essential as it prepares students to be lifelong learning learners and innovative knowledge creators in the knowledge society.

21st century students require new skills to fit with new technological environment. There are several tools which have the potential to support and assist students in developing their 21st century skills for example problem solving skills, interpersonal and self directional skills, communication and collaboration skills, and decision making and learning. Tingen, Philbeck & Holcomb (2011) studied one of these tools and they believed that classroom websites can enhance student learning and build the 21st century skills. Vokis, blogs and podcasts are the web 2.0 tools which can be used by the instructors to connect the students with the course material. Websites were recommended to be built in a way that would encourage students to use them. Therefore they have to contain instructional activities such as assignments, quizzes, collaborative projects, student products and published work. More than 100 classroom websites were investigated whether or not they support students to develop the 21st century skills. The results showed that classroom websites did not meet the needs of the 21st century student. Even though the teachers worked hard to make the websites attractive and they made sure to update the websites continually, they failed to focus more in the content and address the objectives and skills which are needed in the 21st century. A list of recommendations was suggested for educators who want to produce classroom websites by providing them with sample tools and resources that they can use to build effective website aligned with the standards for learning in the 21st century.

Archambault, Wetzel, Foulger & Williams (2010) examined the results of a professional development project which was implemented by a number of educators at Arizona State University, College of Teacher Education and Leadership. The project aim was to help faculty to go along with the new technology, integrate Web 2.0

tools with their teaching and create course material that addressed the 21st century skills. It included a number of organized workshop which was facilitated by the educational technology faculty who explained the social networking tools and created a good atmosphere which assisted the participants to be more confident in using technology. It also used Technological Pedagogical Content Knowledge (TRACK) model to integrate technology with the domains of content and pedagogy instead of allowing technology to be taught in isolation (Koehler & Mishra 2005). The participants who contributed in the professional development program observed positive changes in their teaching. The findings showed that social networking tools could add many benefits in education if it used in a meaningful way and know how to fit it with the content areas and teaching methodologies.

Technology has entered to the human and interacted with all aspects of 21st century society. Parette, Quesenberry & Blum (2010) indicated that the education professionals may be missing the boat of using technology in early childhood settings by not considering technology as a beneficial tool to develop appropriate practice. They found that early childhood teachers needed to be prepared and trained with new technology and the new vision of 21st century by training them on four main areas: 1) how to use research based instructional strategies; 2) understand why a certain technology tool is important to young children; 3) demonstrate ability to use the technology tools; and 4) how to apply them in the classroom. Educating early childhood teachers these four skills will assist them to use technology more professionally and less likely to see insufficient uses of technology practices in education field. It shows that both pre-service education and in-service professional development need substantial improvement in order to use technology effectively which will help to develop appropriate practice and develop skills in using it in classroom settings.

3. Methodology

This study is mainly based upon statistical data analysis. Descriptive research is more effectively within an educational setting. Therefore this work sets out to gather information about present existing situations and aims to answer questions concerning the current status of the subject of the study which is whether or not the educational institutions are prepared for the predefined 21st century visions.

The study includes one of the most common ways of collecting data which is survey in order to reach accurate answers to the research questions and find appropriate explanations and recommendations. The web-based survey distributed and sent as a link by email to instructors/participants from the three educational institutions. The survey was built using Survey Gizmo software. It included 15 benchmark statements and they were divided into 4 categories, 21st century tools, anywhere/anytime access, assessment tools and differentiated learning. Each benchmark statement on the survey had four possible selections and each one indicating the level of use of a particular type of technology at the participant's institution. The lowest level of use (1) received a score of 25, while the highest level of use (4) received a score of 100. The second level of use (2) received a score of 50 and the third level of use (3) received a score of 75. The score indicated how close the institutions were toward achieving a particular benchmark for example a score of 100 means that the goal was accomplished.

4. Findings

We analyze the results of 195 surveys completed by faculties representing the three educational institutions. The sample of this study consisted of 65 surveys from each educational institution. Every benchmark statement had been analyzed in the form of frequencies and percentages. A detailed analysis of responses follows.

4.1 21st Century Tools

4.1.1 Benchmark Statement

As the column graph illustrates, participants from UAEU has the highest number in delivering the educational content primarily through technology with some print–only materials, while 29 instructors from ZU deliver the content through an equal blend of print materials and technology. 27 HCT instructors use both delivering methods, they mainly use technology with some print–only materials and an equal blend of print materials and technology. However there is only an instructor from ZU and HCT who use print materials and none from UAEU. (See Figure 1)

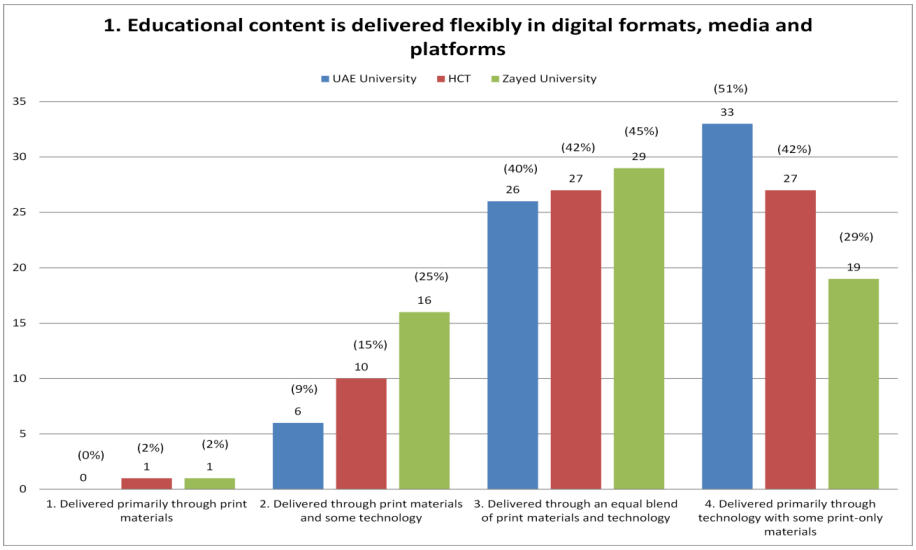

Figure 1. Educational content is delivered flexibly in digital formats, media and platforms

4.1.2 Benchmark Statement

As is shown in figure 2, most instructors from the three educational institutions use regularly the interactive, adaptive, multimedia courseware and simulations in teaching and learning, 48% HCT instructors and around 30% at UAEU and ZU. A quarter of instructors who use them occasionally for example, 26% UAEU, 25% HCT and 31% ZU. It is clearly that more instructors from UAEU agree that they are integrated into the curriculum (25%) than instructors from HCT (14%) and ZU (19%).

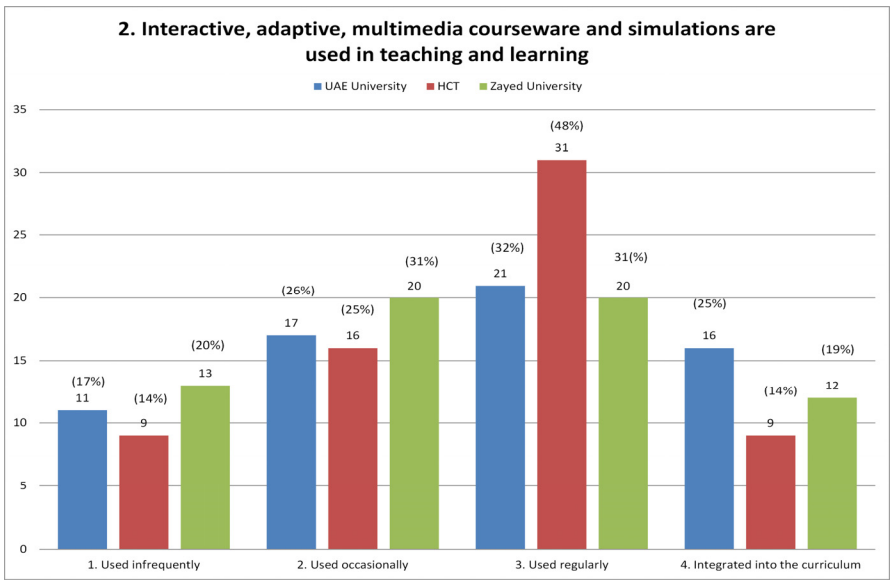

Figure 2. Interactive, adaptive, multimedia courseware and simulations are used in teaching and learning

4.1.3 Benchmark Statement

Figure 3 shows that most instructors from the three educational institutions access the information system which provides student and achievement data in digital format. The highest number of respondents who agree that data are available in digital format is from UAEU, 35 instructors. On the other hand 8% ZU and UAEU instructors who disagree with this statement and believe that not all the student and achievement data are available in digital format. All the HCT instructors agree that the data somehow are offered in digital format.

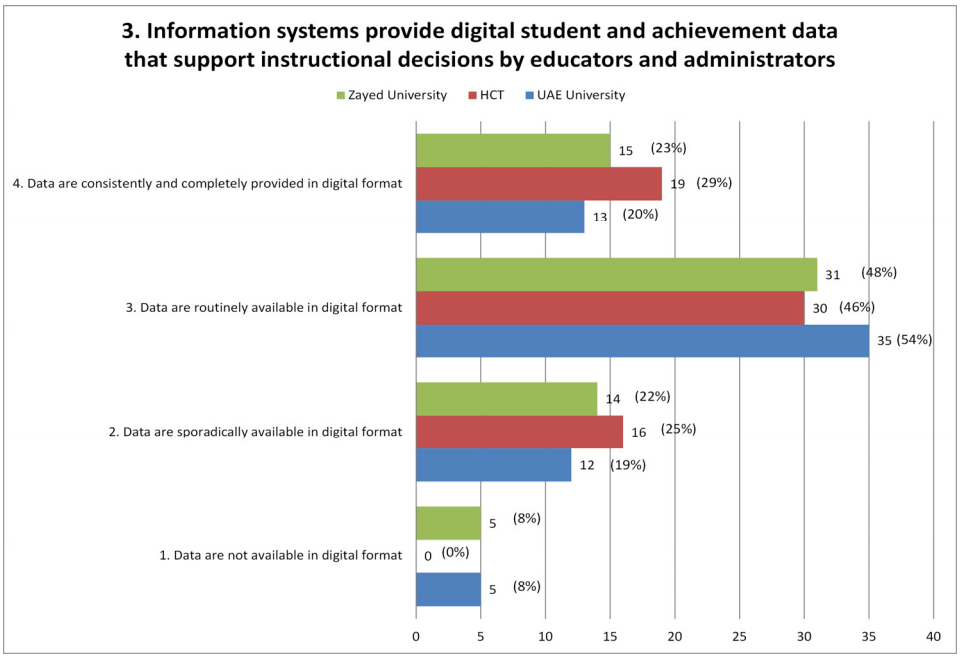

Figure 3. Information systems provide digital student and achievement data that support instructional decisions by educators and administrators

4.1.4 Benchmark Statement

Figure 4 displays that the majority of UAEU and HCT instructors certain that their educational institutions provide high-speed broadband access and they are accessible all over the campus due to facilitate in communication, administrative and instructional needs. On the other hand 49 ZU instructors do not agree with this statement and 36 instructors believe that the high-speed broadband access is available in most classrooms libraries and student/educator workspaces. It is clear that 44 HCT instructors have high-speed internet access that gives them the opportunity to communicate easily and complete all requirements, while other two educational institutions have access to the internet in few campus locations and in some areas access is not available.

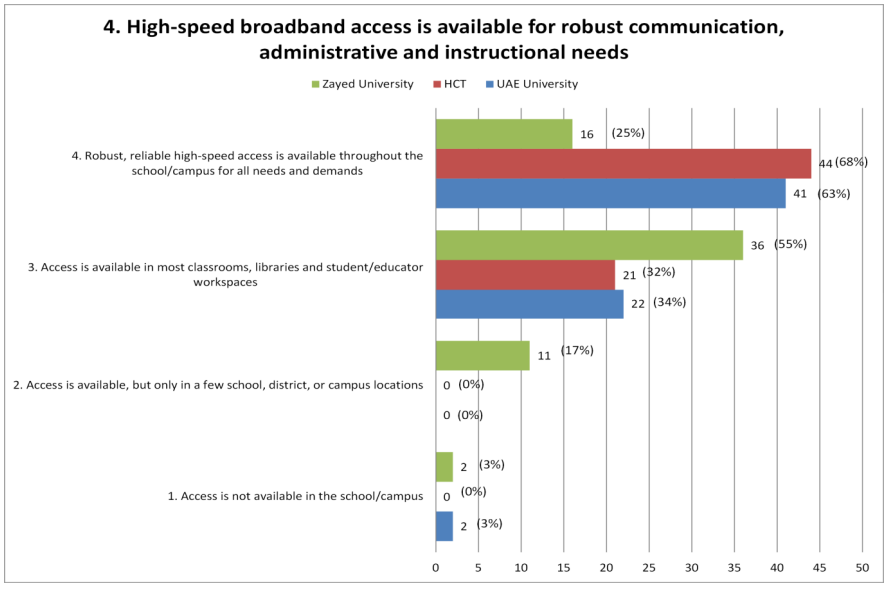

Figure 4. High-speed broadband access is available for robust communication, administrative and instructional needs

As is shown in table 1, there is relatively change in the average scores within the number of responses for the 21st century measure. The third and fourth responses for all benchmark statements have the highest average scores compared to the first and second responses.

Table 1. Average score for 21st century tools measure

21st Century Tools	**4. High-speed broadband access is available for robust communication, administrative and instructional needs**	4. Robust, reliable high-speed access is available throughout the school/campus for all needs and demands	34
		3. Access is available in most classrooms, libraries and student/educator workspaces	26
		2. Access is available, but only in a few school, district, or campus locations	4
		1. Access is not available in the school/campus	1
	3. Information systems provide digital student and achievement data that support instructional decisions by educators and administrators	4. Data are consistently and completely provided in digital format	16
		3. Data are routinely available in digital format	32
		2. Data are sporadically available in digital format	14
		1. Data are not available in digital format	3
	2. Interactive, adaptive, multimedia courseware and simulations are used in teaching and learning	4. Integrated into the curriculum	12
		3. Used regularly	24
		2. Used occasionally	18
		1. Used infrequently	11
	1. Educational content is delivered flexibly in digital formats, media and platforms	4. Delivered primarily through technology with some print-only materials	26
		3. Delivered through an equal blend of print materials and technology	27
		2. Delivered through print materials and some technology	11
		1. Delivered primarily through print materials	1

4.2 Anytime/Anywhere Access

4.2.1 Benchmark Statement

It can be clearly seen that more than 25 instructors from the three educational institutions have high-speed broadband access that support instructional uses such as collaborative learning and any other multimedia rich interactions. 49% HCT instructors have high speed broadband and access is available, but it is used infrequently

for instructional purposes and 43% ZU instructors who agreed with this statement. There are few instructors from the three educational institutions agreed in the first and second statements which are: access is available but only in a few campus locations and access is not available. (See Figure 5)

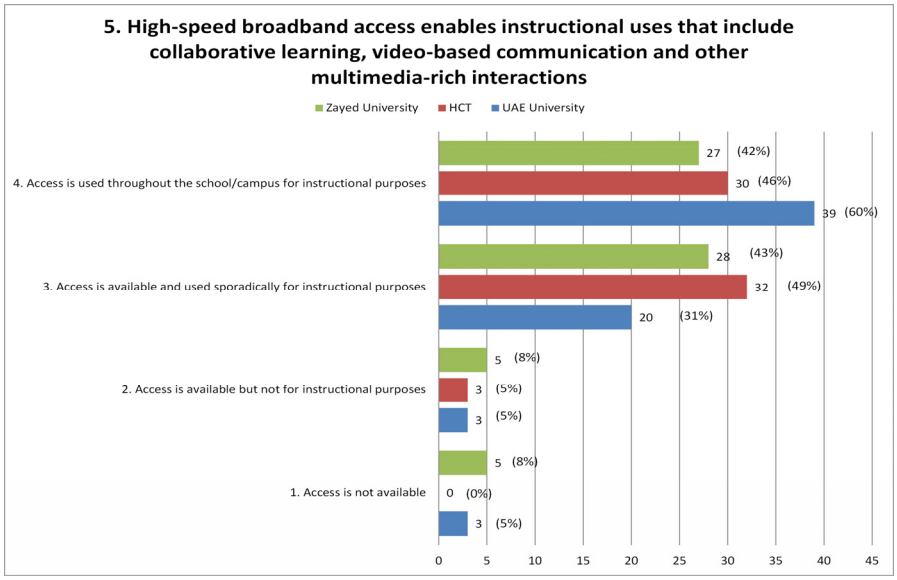

Figure 5. High-speed broadband access enables instructional uses that include collaborative learning, video-based communication and other multimedia-rich interactions

4.2.2 Benchmark Statement

As an overall trend, it is clear that the majority of HCT and UAEU instructors use an extensive education website/portal which offers different facilities such as administrative, instructional and collaborative tools and resources. Conversely, the numbers of ZU instructors remain stable in third and fourth statements. As 11% of them who have limited access to the administrative information and academic information on the portal. (See Figure 6)

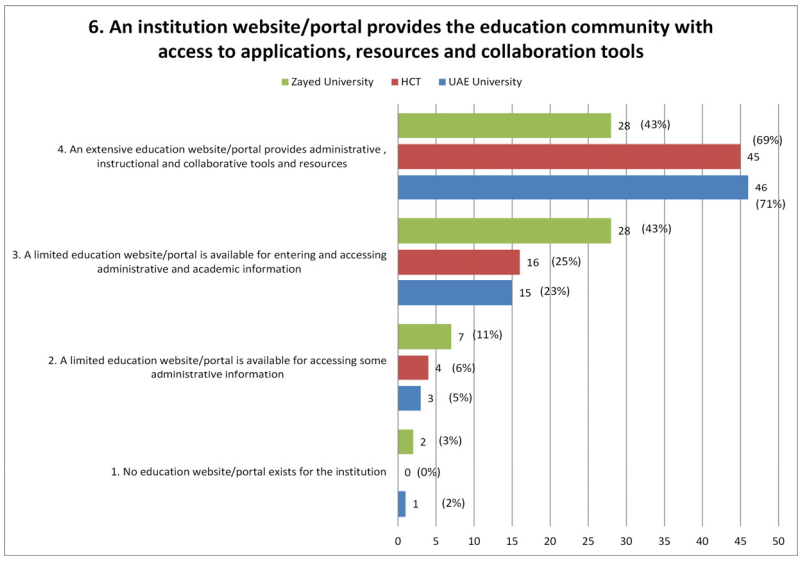

Figure 6. An institution website/portal provides the education community with access to applications, resources and collaboration tools

4.2.3 Benchmark Statement

According to the figure 7, 34 of the participants from the two educational institutions, ZU and HCT can access to the internet wirelessly and is available everywhere on the campus, with support for many mobile devices. The numbers of participants from UAEU who have widely access of internet on the campus reduce slightly to 31 participants. The same number of participants can have ubiquitous and reliable access for most all student, educator and administrator devices. 25% ZU instructors have wireless access only in some locations and support a few mobile devices. On the other hand only 3% HCT and UAEU participants agree on this statement as most of them have reliable access which provides them with good facilities and support.

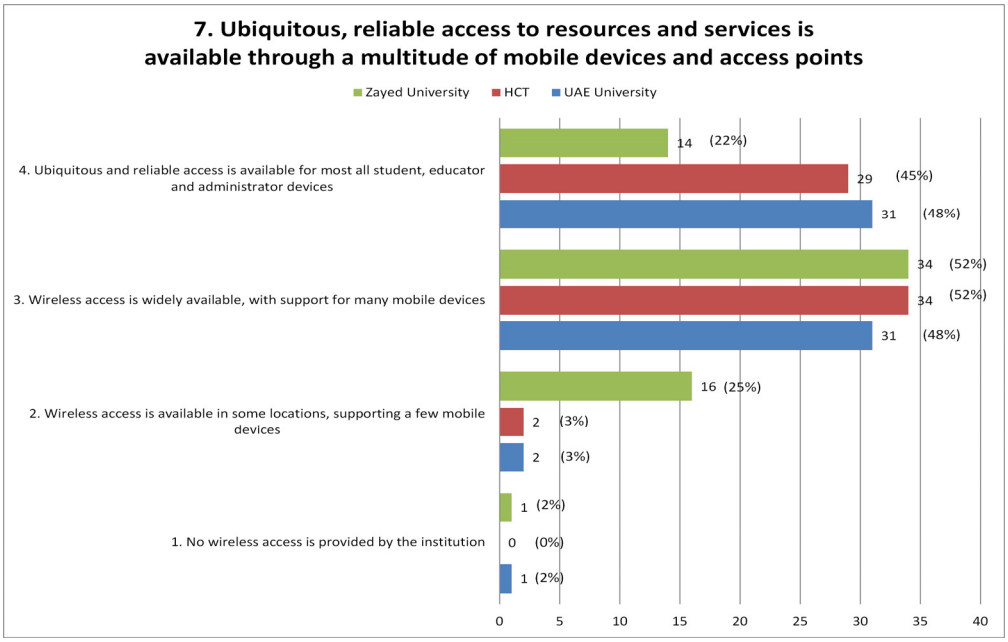

Figure 7. Ubiquitous, reliable access to resources and services is available through a multitude of mobile devices and access points

4.2.4 Benchmark Statement

As is shown in figure 8, the rate of ZU participants who agreed that online courses are not offered to students is high compared to the rate of of HCT and UAEU participants. 27 HCT instructors believe that online courses are available, but just for a small number of courses. 20 ZU and 27 UAEU instructors agreed with this statement. It is clear that HCT instructors (20) have more large number of online courses and virtual program than UAEU (17) and ZU (9) instructors. The rate of participants for HCT and ZU who have a full catalog of online courses and is available to all their students has dropped dramatically about 5% however 17% of participants are from UAEU.

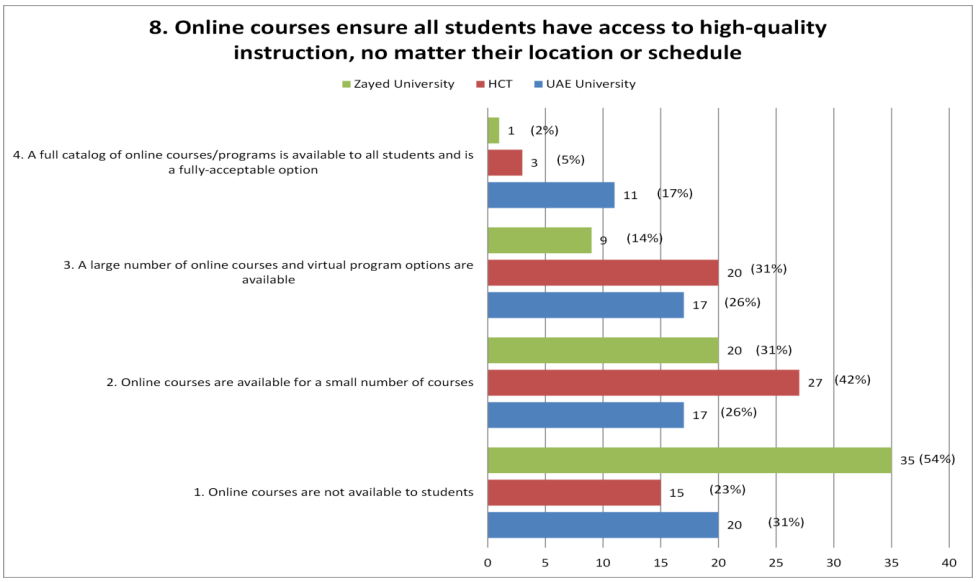

Figure 8. Online courses ensure all students have access to high-quality instruction, no matter their location or schedule

4.2.5 Benchmark Statement

The bar graph shows how the participants receive their online PD resources and courses. There are substantially more ZU instructors (24) who receive face to face PD than HCT and UAEU instructors. There is an increase in the number of UAEU instructors (24) who receive a limited number of online PD. 23 HCT instructors who receive online PD plus virtual peer communities that are employed by educators and administrators. It is clear that only 4 instructors from ZU and 12 from HCT and UAEU who receive both online PD courses and virtual peer collaborative communities which are widely employed by educators and administrators. (See Figure 9)

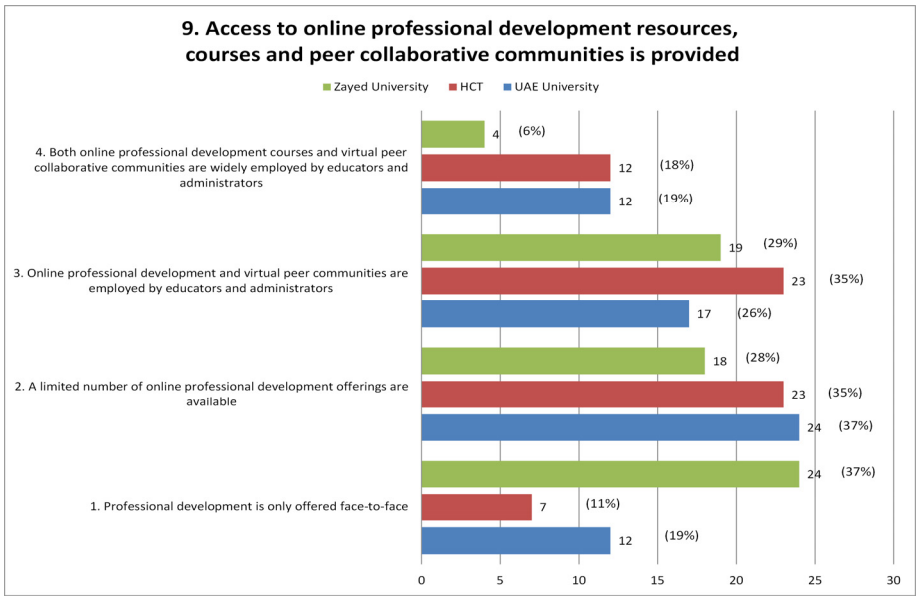

Figure 9. Access to online professional development resources, courses and peer collaborative communities is provided

Table 2 shows that not all the participants indicated the most extensive use for anytime/anywhere access tools. The average scores within the number of responses have changed from one statement to another. The majority of the participants have chosen the fourth responses for the fifth and sixth benchmark statements, while the average score has decreased relatively on seventh statement. The level of use of anytime/anywhere tools have dropped radically in eighth and ninth statements.

Table 2. Average score for anytime/anywhere access measure

Anytime/Anywhere Access	**9. Access to online professional development resources, courses and peer collaborative communities is provided**	4. Both online professional development courses and virtual peer collaborative communities are widely employed by educators and administrators	9
		3. Online professional development and virtual peer communities are employed by educators and administrators	20
		2. A limited number of online professional development offerings are available	22
		1. Professional development is only offered face-to-face	14
	8. Online courses ensure all students have access to high-quality instruction, no matter their location or schedule	4. A full catalog of online courses/programs is available to all students and is a fully-acceptable option	1
		3. A large number of online courses and virtual program options are available	9
		2. Online courses are available for a small number of courses	20
		1. Online courses are not available to students	35
	7. Ubiquitous, reliable access to resources and services is available through a multitude of mobile devices and access points	4. Ubiquitous and reliable access is available for most all student, educator and administrator devices	25
		3. Wireless access is widely available, with support for many mobile devices	33
		2. Wireless access is available in some locations, supporting a few mobile devices	7
		1. No wireless access is provided by the institution	1
	6. An institution website/portal provides the education community with access to applications, resources and collaboration tools	4. An extensive education website/portal provides administrative , instructional and collaborative tools and resources	40
		3. A limited education website/portal is available for entering and accessing administrative and academic information	20
		2. A limited education website/portal is available for accessing some administrative information	5

5. High-speed broadband access enables instructional uses that include collaborative learning, video-based communication and other multimedia-rich interactions	1. No education website/portal exists for the institution	1
	4. Access is used throughout the school/campus for instructional purposes	32
	3. Access is available and used sporadically for instructional purposes	27
	2. Access is available but not for instructional purposes	4
	1. Access is not available	3

4.3 Assessment Tools

4.3.1 Benchmark Statement

As displayed in figure 10, there are more HCT instructors (52%) than other instructors from other educational institutions 39% ZU and 34% UAEU who agree that the personal e-portfolio are implemented occasionally for some courses. 40% respondents from UAEU who believe that personal e-portfolio are not applied in the university however, 12% who believe that it is implemented for many course and 14% who disagree with this statement and agree that personal e-portfolio ubiquitous with students and are fully implement through the education system. Quarter of respondents from HCT and ZU agree that the e-portfolios are not applied to their students. On the other hand around 25% who agree that the e-portfolio system is implemented in many courses.

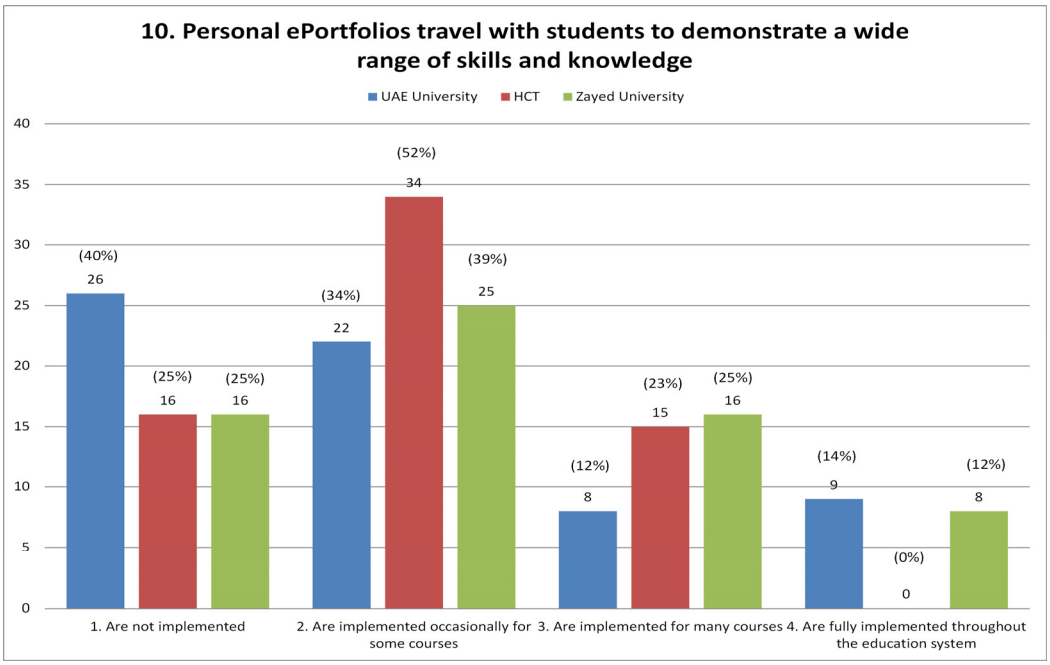

Figure 10. Personal e-Portfolios travel with students to demonstrate a wide range of skills and knowledge

4.3.2 Benchmark Statement

The responses show that two thirds of instructors from the three educational institutions who prepare computer based exams for some of the assessments. The number of HCT instructors who mostly depend on technology to make their assessment are much more than other instructors from other educational institutions. 10 instructors from UAEU who use technology all the time to prepare their assessments and only three HCT and ZU instructors who prefer computer based exams. There are 12 ZU, 4 UAEU instructors and one HCT instructors who do not use technology for preparing their tests (See Figure 11).

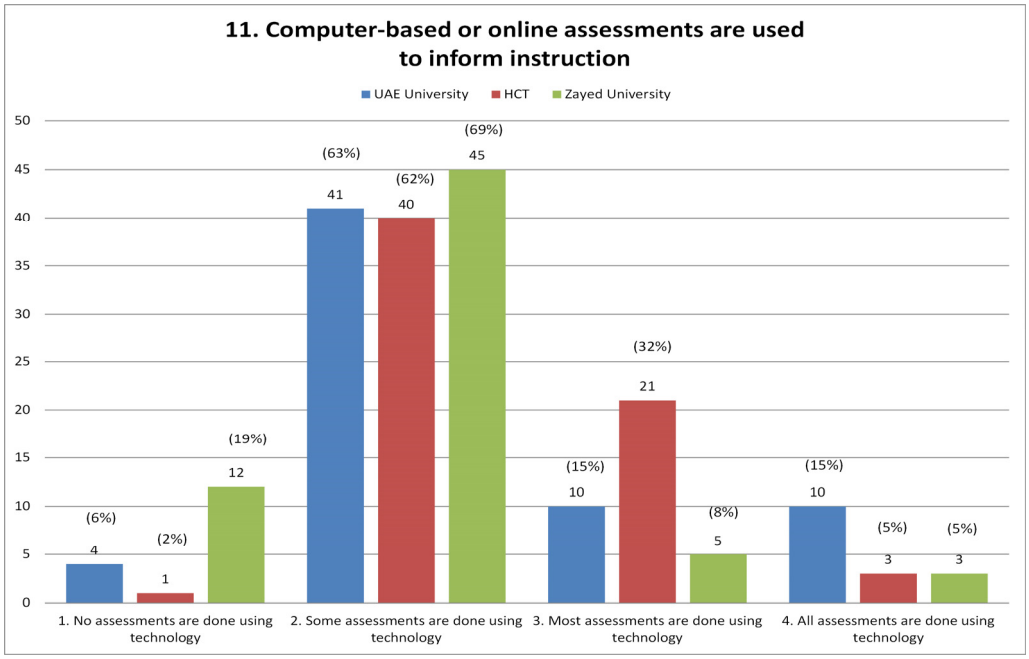

Figure 11. Computer-based or online assessments are used to inform instruction

4.3.3 Benchmark Statement

Figure 12 reveals that most instructors (59% ZU, 54% HCT and 40% UAEU) agree that technology-based assessment is occasionally used to measure only student achievement and not 21st century skills. Nevertheless 40% HCT, 31% UAEU and 19% ZU instructors disagree with this statement and believe that they are often used to measure both student achievement and 21st century skills. However, 17% of UAEU instructors always used the assessments to measure student achievement and 21st century skills. Though 20% of ZU instructors use paper and pencil assessments which are not measured either student achievement or 21st century skills.

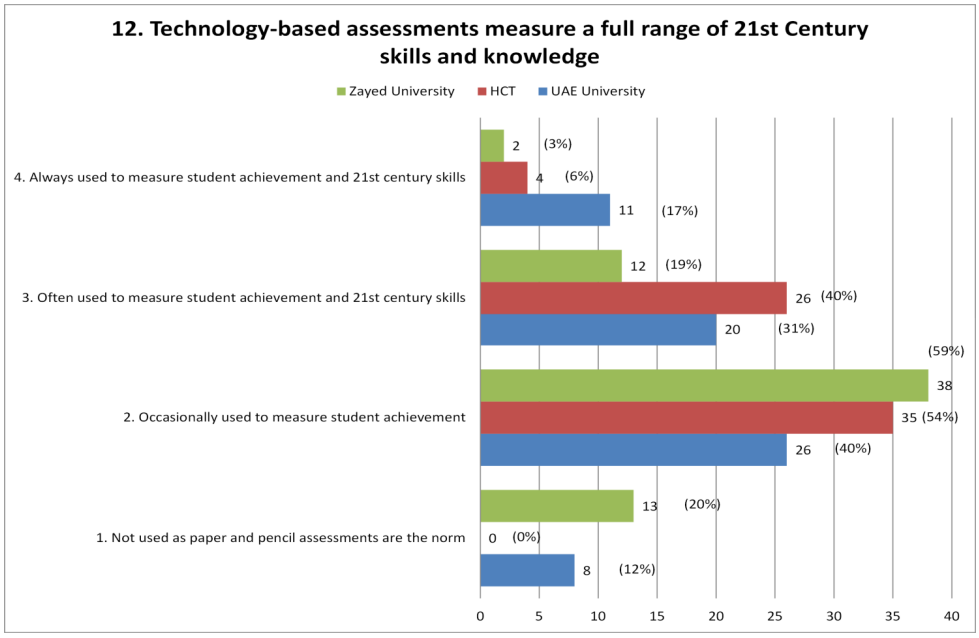

Figure 12. Technology-based assessments measure a full range of 21st Century skills and knowledge

The assessment tools measure tend to have the lowest scores compared to the 21st century tools and anytime/anywhere access measures. This means that the least amount of progress is seen in assessment tools. (See Table 3)

Table 3. Average score for assessment tools measure

Assessment Tools	**12. Technology-based assessments measure a full range of 21st Century skills and knowledge**	4. Always used to measure student achievement and 21st century skills	6
		3. Often used to measure student achievement and 21st century skills	19
		2. Occasionally used to measure student achievement	33
		1. Not used as paper and pencil assessments are the norm	7
	11. Computer-based or online assessments are used to inform instruction	4. All assessments are done using technology	5
		3. Most assessments are done using technology	12
		2. Some assessments are done using technology	42
		1. No assessments are done using technology	6
	10. Personal ePortfolios travel with students to demonstrate a wide range of skills and knowledge	4. Are fully implemented throughout the education system	6
		3. Are implemented for many courses	13
		2. Are implemented occasionally for some courses	27
		1. Are not implemented	19

5. Conclusion

The intent of this research is to determine how prepared are the educational institutions for the predefined 21st century visions and the difference between the three educational institutions in getting their technological standards ready for the 21st century. The main reasons of this research are to investigate how ready the educational institutions for the 21st century, identify 21st century tools that are used in the three educational institutions, examine the abilities of students to learn from any where any time and study the type of assessment tools which are practiced in the educational institutions.

Based on the findings of this research, it is apparent that every educational institution has different approach to the 21st century visions and they are prepared at different levels. There is relatively change in the average scores for the three measures, 21st Century Tools, Anytime/Anywhere Access and Assessment Tools.

In this research, survey results have been compiled, tabulated and analyzed from respondents representing the three educational institutions. The study began by highlighting the changing needs of the 21st century learners and the importance of having instructional and enterprise framework that embraces technology and 21st century skills. According to the results, the three educational institutions have made progress over time, but they stand now at a new crossroad. Marginal improvements in the education system are no longer sufficient, systemic change is necessary. In order to prepare the students to be digital citizens and succeed in a global society, higher education has to combine proven, well-implemented and well-supported technologies with sound educational approaches.

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