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ICT 4D in the form of E-Learning and M-Learning

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ABSTRACT

This paper provides a critical review on e-learning and m-learning based on studies conducted by two different scholars. The first journal which is written by Matti Hverila and Reza Barkhi, titled "The Influence of Experience, Ability and Interest on e-learning Effectiveness". The researchers examined the effectiveness of e-learning process based on four areas; learning preconception, prior e-learning experience ability and interest of students. The second journal titled "Mobile learning: From Single Project Status to the Mainstream", written by Olaf Zawacki-Richter, Tom Brown and Rhena Delport. The researchers try to find out the use of m-learning among distance education practitioners or users. They looked to see if m-learning has caused a paradigm shift and litheness in the area of distance education. The purpose of this paper is also to criticize the methodology used and suggesting dependable method for future research.

Keywords: *e-learning, m-learning and ICT for development.*

I. INTRODUCTION

In recent years ICT has been seeped into education. ICT have been introduced in preschool education up to varsity level. Teaching and learning via computer application has evolved to a higher level where it is integrated with internet. Information Communication Technology also known as (ICT) plays a vital role in many sector of a nation such as in economy, medical, education and so forth.
The combination of both (ICT and education) has created a new dawn in education. The role of educators' has been reduced from teachers to facilitators. This is clearly seen in the usage of ICT in classroom where, application run by the computer conduct the teaching, explaining, elaborating and assessing students.

According to Christine Miller, (n.d) over a thousand years the classic education was the only theory practiced by western civilization.

"Though this system [classical education] did not receive the distinct development connoted by its name until the Middle Ages, still it extends in the history of pedagogy both backwards and forwards; for while, on the one hand, we meet with it among the classical nations, the Greeks and Romans, and even discover analogous forms as forerunners in the educational system of the ancient Orientals, its influence, on the other hand, has lasted far beyond the Middle Ages, up to the present time."Willmaman,(1907).

Many countries adapted this theory to their local context and produced many capable people that marked history for example, Archimedes, St. Paul, St. Patrick and Columba, Dante, Leonardo da Vinci, Galileo, Sir Isaac Newton, Christopher Columbus, Shakespeare, and George Washington, Thomas Jefferson, and John Adams. Christine Miller, (n.d). The success level and its influence were well known.

Blurton, C, (1999) defines ICT as "a set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information" (p.1). Technological tools refer to internet, computer, and mobile devices.

Communication in recent years has evolved where gadgets are used to transfer message. Drastic shift has been seen in pedagogy of teaching where blackboards are been replaced by computers and internet accessibility is vital. The role of an educator has been questioned, where more emphasis is drawn on the input received from the gadgets rather then the educator. The acceptance of applying technology in the classroom has brought much debate among scholars on the acceptance and its effectiveness in educating. The usage of such technology is not just limited in secondary schools in fact it has been injected into varsities.

II. GENERAL ARGUMENTS OF THE AUTHORS.

Haverila and Rezabahri (2009) mentioned that "their objective is to better understand the interrelationship among learning presage variables (preconceptions, prior e-learning experience, ability and interest) of students on their perceptions regarding the process of e-learning and furthermore on the effectiveness of e-learning" (p.2). On the other hand, Richter, Brown and Delport are investigating if ICT in the form of mobile learning has created a "paradigm shift" in the education pedagogy.

Neither authors were bias positive or negative in terms of ICT 4D because both authors conducted the research in finding out answers to the problem statement, but based on the findings of Brown and Delport, it can be clearly said that there is certain amount of biasness in their research paper, to support this claim, it was reported by the author them self that due to the low diffusion of m-learning, which only represents 14% of institution out of which, 73% of the respondents have not

experienced distance learning via m-learning mode. Moreover, with the low diffusion of m-learning, the findings reported by Richter, Brown and Delport are doubtful and debatable.

Both articles are practical with their arguments but after intensive reading it was found that the article written by Matti Haverila and Reza Barkhi presented an intensive argument, this is because the sample used are adult learners. There were only 14 respondents from the Open University and 25 respondents from Tamk University comprising of both genders. With this element of gender and maturity biasness has been avoided.

Besides that the researcher used ANOVA analysis to see the difference of both genders. The p-value is at 0.89, which means there is no difference in gender with regards to effectiveness of e-learning.

The researcher focuses on the fundamentals of learning key words like "preconceptions", "experience" and "ability" clearly shows that the study solely focuses on the ability of the students understanding and sustaining e-learning mode of teaching.

Based on table 5; the researcher indicates that there is no significant on six of the variables tested statistically. The variable that did not show any significant results are, value of e-learning, (0.240); experience with e-learning, (0.587); background suitability to e-learning, (0.528); motivation, (0.546); contribution of collaboration towards learning, (0.743); and individual responsibility in the learning environment, (0.274).

Table 5: Summary statistics and t-tests of difference between the more and less experienced groups in the e-learning environment

Variable	Mean (SD)		Test of Equality	
	Group 1	Group 2	Test Statistic	p-Value
1. Attitude towards e-learning prior entering the course	6.07 (0.83)	5.08 (0.91)	3.46	**0.002******)**
2. Value of e-learning	4.75 (1.46)	4.24 (0.77)	1.27	0.240
3. Experience with e-learning	3.64 (2.02)	3.28 (1.88)	0.55	0.587
4. Learning style suitability to e-learning	5.64 (1.39)	4.68 (1.14)	2.20	**0.038*****)**
5. Background suitability to e-learning	4.86 (2.28)	5.28 (1.06)	-0.65	0.528
6. Active learner and self-starter	5.93 (1.14)	4.76 (1.09)	3.11	**0.004******)**
7. Motivation	5.86 (1.10)	5.64 (0.99)	0.61	0.546
8. Collaboration	4.64 (1.59)	4.48 (1.19)	0.33	0.743
9. Need for synchronized meetings	5.43 (1.16)	4.72 (1.40)	1.70	0.100
10. Need for asynchronous meetings	6.36 (1.01)	5.00 (1.08)	3.92	**0.001******)**
11. Responsibility	5.29 (1.90)	5.92 (1.22)	-1.13	0.274
12. More effective	3.36 (0.75)	3.80 (0.71)	-1.81	0.081

*) $p<0.05$ **) $p<0.01$

III. METHODOLOGICAL APPROACH

In terms of methodology, both journals have applied two different methods. The journals written by Haverila and Barkhi which focused on

E-learning is based on 39 respondents. The participants came from two courses: Software business course at Tamk University of Applied Science in Temper, Finland, and E-learning Professional course at Open University in United Kingdome. However, the journal written by Richter, Brown and Delport whose journal is based on M-learning for distance education consist of 88 respondents from 27 countries.

According to Richter, Brown, and Delport (2010), from 27 countries that they distributed the survey; South Africa, Germany, Canada and Great Britain are majority of the respondents. According to Morgan's table for determining sample size, for 100,000 population size at p=0.05, the sample size recommended is 380. In other words, to have a reliable research based on a 100,000 population the total respondents needed to obtain reliable research findings is 380 people (respondents).

Haverila and Barkhi, (2009) conducted a seven point Likert scale. The survey from two different Universities which has both open and close ended questionnaire, whereas Richter, Brown and Delport conducted a closed ended online survey. The data generated was also interpreted differently.

Haverila and Barkhi, (2009) applied the triangulation method to interpret the data. The author used statistical interpretation such as t-test, p-value and standard deviation. Not only that the author also supported their statistical findings with direct quotations stated in the survey by the respective respondents. This really helped in understanding the viewpoints of the respondents, with regards to the main subject.

The journal written by Richter, Brown and Delport, (2010) used statistical interpretation only. They also mentioned the number of sample responded to the particular section of the survey. It is more appropriate to use qualitative method rather than quantitative method because the data gathered is greatly restricted to numerical scores. Numbers itself is not tangible enough in generating a concrete feedback. This is because qualitative method focuses more on words (narrative description).

With words as feedback one can clearly see the insight of the respondents view, digesting and interpreting words helps to create a better picture. Hence, it also helps the researcher to look at different perspectives. Haverila and Barkhi, (2009) used narrative description to support their findings.

For qualitative approach the primary data validity is assessed through cross-checking. By applying such method the validity of the finding is unquestionable compared to data obtained via numerical scores. Moreover, qualitative method main focus is on assessing and improving reliability of scores obtained from instruments. Not only that the validity assessment is based on reliance of statistical indices, (Babbie, 2007).

Qualitative also focuses on purposive samples, meaning that the samples should be our target group rather than random sampling method for quantitative method. The findings for qualitative method states in a narrative form which it provides a holistic description, which also generats a general or overall point of view, (Babbie, 2007).

Qualitative method would be an ideal approach this is because qualitative research method sees the situation as an experience or other words more on hands-on experiences or field work (Babbie, 2007).

According to Babbie, (2007), qualitative research is the primary instrument for data collection and analysis. Data are mediated through this human instrument, rather than the means of inventories, questionnaires, or machine. But if one would really want to understand, and seep into the core and find out the truth without any biasness, then the mix method would be ideal method.

The mix-method approach that adopts, both qualitative and quantitative is applied to interpret the findings of the study. According to Brannen, (2005) mixed methods research means adopting a research strategy employing more than one type of research method.

As all are well aware that qualitative in more focused on meaning and quantitative is more on numerical interpretation, the combination of both methods would provide a convincing data interpretation as well as conclusion since both method are combined.

The mix method research was conducted by Haverila and Barkhi. The interpretation of data in numerical and narrative form, which precisely explained the differences found in both samples. This information is found on Table: 5 of the journal for the numerical data and the narrative data was interpreted right after that. Hence, the researcher has clearly shown the significant similarities and differences obtained.

IV. FINDINGS OF THE STUDY

The journal written by Haverila and Barkhi, (2009) presented some interesting information. Their study focused on the consequence of learning preconceptions, prior e-learning experience, and the capability and curiosity of students on their perceptions to the process of e-learning and hence looking into the usefulness of e-learning.

The researcher tested if there was a significant difference among both genders by conducting an ANOVA test. The results were negative, the difference between the mean scores were at a p-value of 0.89 at a .05 level. Both genders were similar on the effectiveness of e-learning.

There were several variables tested by the researcher. The perception of students on e-learning were measured by looking into the mind-set towards e-learning, value of e-learning, capability and awareness in e-learning, learning environment, and usefulness of e-learning.

The researcher measured value in terms of worth fullness in learning. The Cronbach Alphas for both Universities were at 0.83 for Open University, (OU) and 0.77 for Tamak University, (TPU). This is a clear indication that both groups were in agreement in the way they perceived the items.

The Cronbach Alpha test was conducted to look at the ability and interest ,where was measured by the suitability of learning style to e-learning, suitability of background to e-learning, as

well as the perception of students where they are to be active learners plus self-starters. OU measured at 0.25 and 0.74 for TPU.

The researcher also explains that the reason of the high value of Cronbach Alfa is because the two variables were testing data from two different Universities. This is not acceptable because, Cronbach Alpha is to test the validity of the variables measured in research.

Based on the second variable, which looked into the perception of learning environment, the Cronbach Alfa score obtained foe OU is negligible. This is because the Cronbach Alfa test performed for OU is at 0.10.

The variables were measured by students motivation, contribution of collaboration towards learning, need for synchronized and asynchronous meetings, plus perception on the responsibility of the student in learning environment.

The author informs that the sandwich between the two variables is significant where the p-value is less than 0.05.

The variable attitude is significant to perceive value of e-learning at (r=0.434; p=.006), prior e-learning experience (r=0.373; p=.019), suitability of learning style to e-learning (r=0.458; p=.004), active learning (r=0.450; p=.004) and need for asynchronous meetings (r=0.616; p=0)

Prior e-learning experience is positively correlated to learning style at (r=0.345; p=.032). The value of e-learning shows positive correlation to learning style and it is significant.

The suitability background of e-learning is positively correlated at (r=0.340; p=.034), motivational level, (r=0.516; p=.001), active learning (r=0.552; p=0) and collaboration contribution towards learning is (r=0.369; p=.021), which are significant.

Individual responsibility in the learning environment is positively correlated with collaboration where r=0.595 and p=0.the need of synchronous meetings recorded (r=0.322; p=.046) and same goes for active learning which is positively correlated, where r= 0.322 and p=.046. This shows that the variables are significant to the study.

Lastly, the need for synchronous meeting appears to be positively correlated to the need for asynchronous meetings, r=0.356; p=.026. The variables are significant to the study. However, at the same time it is negatively correlated to individual responsibility in the learning environment where r= -0.445 and p=.005. Despite the fact being significant, at the same time the correlation is at a negative point.

The researcher also explained that there is no significant difference between both samples for value of e-learning, experience with e-learning background suitability to e-learning, motivation, contribution of collaboration towards learning and individual responsibility in the learning environment.

The motivational level of both respondents was similar. According to the researcher their findings are similar with previous researchers findings such as, Mancuso-Murphy, (2007) and Vaughan, (2007) whom suggest that in e-learning environment an individual needs to be an "autonomous learner, self-directed, motivated, self-disciplined, assume responsibility for his or her own learning, and should possess time management skills and should not procrastinate".

The researcher also concludes that both groups of respondents have a positive view point about e-learning. Their findings are also similar to previous researchers' findings of Vaughan, (2007), Alexander, (2001), and Piskurich, (2006).

They found that there were significant difference in opinion on "preconceptions, experience, ability and interest" between both samples. This was indicated by the hands-on experience both samples had. It was evident that the more experienced group seems to have more encouraging behavior towards e-learning. The researchers also states that the more experienced group learning style is more appropriate, since they are active learners.

It was also found that the more experienced sample highlighted that there is a need for synchronous and asynchronous meetings. The feedback gathered was unexpected as the less experienced students did not announce the need to do so.

In terms of the effectiveness of e-learning, the more experienced sample considered e-learning to be less effective than the less experienced sample. The research interprets that students that are not familiar to new applications or model had indirectly affected the usefulness of e-leaning for them.

Based on the qualitative data interpretation, the researcher's findings suggest that when collaboration and interactive are combined with the elements of Blooms taxonomy, it indirectly produces a positive effective e-learning outcome.

The researcher also suggests that students should understand how to navigate an e-learning module. The importance of doing so is to see the suitability of the system towards each individual student.

The findings also suggest that collaboration is vital because it indirectly facilitates learning as well as enhances critical thinking. Bench-mark of student's achievement is important in measuring the success of the application to the student. Peer-to-peer assessment is perceived to be the best mode recommended by the researcher.

According to Haverila and Barkhi, (2009) the importance of applying current input is seen crucial for an interactive and process oriented course. This is because the feedback obtained by the students is delayed due to time factor. The fast response time of the facilitator helps to reduce the buffering process. Below are some direct quotes from the respondents who suggest the urge for face-to-face communication.

> *"It would have been advisable to kick start the course with one face-to-face meeting with the participants. In this meeting the general guidelines and procedures of the course could have been explained in much more clear manner than in the Moodle course info."* p.16

"First time should have been face-to-face and all the contents etc. of the course should have been explained clearly." p.16

Despite the small number of fallback on the effectiveness of e-learning, the comments below indicate that many students found e-learning environment to be very conducive and effective to learning.

"I've got many very interesting links from the teacher and other students that may not have gone in to my mind." p.17

"I think it was successful because of the content and tools we are learning and how tutors are helping us." p.17

"We are using and gaining experience with quite a good range of the technologies currently available for e-learning." p.17

A total percentage of 59.1% institutions, offered both face-to-face (contact-based) and distance learning program. Only a handful of the institutions are traditional distance teaching institutions which consist of 10.2% traditional distance teaching institutions, campus-based institutions. On the other hand 3.4% of respondents came from purely online teaching institutions or virtual universities. The private training institutions, community colleges or e-learning service providers and vendors were only 12.5% from the total respondents.

Based on the survey it also seeks information on future development of institution on developing m-learning resources. It was reported that nearly 50% of the institution have no such plans. On the other hand, 37% of the institution had taught of developing such materials and are in the pipeline. However 14% of respondents stated materials for m-learning have been made or developed, it is unknown about the usage.

The survey also gained insight on the respondents experience, knowledge or hands-on in using such application. It was mentioned that 62% of respondents reported had personal experience or have read on the subject. At the same point 71% were involved on m-learning related tasks.

Not only that approximately 50% of the respondents agreed to a point where m-learning is not implemented in their institution. Only 5% is used in project throughout the institution, where 2.3% is used in the main stream. This is evident that the number of respondents participated in this study is insufficient to produce a reliable output. The researcher should have gathered more respondents before interpreting the data collected.

Surprisingly, 36.4% of respondents stated that there is no support available from the teaching institution to offer e-learning or mobile learning courses, although some respondents mentioned that there are plans to set up a support unit in near future. Mobile learning was, however, expected by the majority of respondents (78.4%) to become an integral part of mainstream, higher education and training within three to five years.

Based on the study it was also mentioned that 67% of online teaching and 56% of distance teaching are currently budding equipment or resources for m-learning. Despite the encouraging percentage in both institutions, contact-based institutions only 24% of this institution are practicing it.

In terms of new strategies and methodologies which are used for mobile learning, 61% of respondents expected that teaching. It was also reported that, learning strategies and methodology would adapt continuously and 56% of respondents said it will remain the same. At the same time 77% of the respondents agreed to the fact that m-learning enhance teaching and learning independently.

Based on the findings, one respondent wrote that “mobile devices will make learning even more flexible and spontaneous than 'traditional' e-learning”. This shows that the respondents have understood what is m-learning where participants could already for see the future of teaching and its benefits. Which is true since 72% of the respondents believed it would create new opportunities for leaner’s and produce more content development.

A total of 88% agreed that m-learning would facilitate new strategies and methodologies for learner support and content development plus delivery in distance education. This particular group of respondents also acknowledges that they were knowledgeable on mobile learning as they were personally doing research on mobile learning. With regards to the respondents that have acquired experience in mobile learning are uncertain with m-learning ability. They are hesitant on the ability of m-learning to facilitate new strategies and methodology for distance education in near future.

From these findings it is, thus concluded that the expectations concerning the affordances of mobile learning are based on knowledge and experience of mobile learning.

The general expectation on the impact of m-learning for education especially higher education was reported at 54%. However, 20.7% of the respondents thought that the development of m-learning would exclude parts of the population who have no access to mobile devices.

On the other hand, 64% of the respondents agreed that positive impact on accessibility as well as cost of such gadgets would be reduced; this would help to reduce the digital divide. However, 86% of respondents felt that the digital divide will not be affected even with the implementation of mobile learning.

Based on the second journal written by Richter, Brown and Delport (2010) they found that the saturation of mobile learning (m-learning) is low in the 27 nations that participated in the survey, with only 14% of the nations are involved. The biasness in the finding was found since 73% of the respondents were from traditional distance learning. In-short it is understood that institution that practices traditional mode has a lower usage of m-learning in distance education.

Both distance learning and mixed mode teaching institutions are currently working on materials for m-learning. A total of 88% respondents reported that they were personally involved in m-learning projects and 71% stated that they were either direct or indirectly involved in their own or institutions m-learning.

On the other hand, in order to reduce the gap on digital divide 64% of the respondents recommended wireless devices as the main gadget. At this present time there is no significant proof that m-learning is branch of typical everyday education. A total of 54% of the respondents agreed to the fact that m-learning will widen access to education due to the intensive use of mobile phones and wireless communication mainly in developing countries. But one must also bear in mind the cost of developing such infrastructure. In underdeveloped and developing countries, communication technologies such as wireless devices are very costly. The money spent on this infrastructure, would be much useful for their daily survival (food).

Research done by Richter, Brown and Delport, (2010) reviled that 29 % of the respondents anticipated learning theories to be replaced, where as a large number of respondents agreed, 72% that m-learning creates new opportunities for learner support, content development and delivery. In spite of that, only 12% of experts agreed to the fact that m-technology would have radical changes on the pedagogy of teaching. These are possibly because the pedagogy of teaching has not gone through drastic transformation even with the implementation of technologies into classroom. On the other hand, 77% responded positively that it will enhance teaching and learning.

The findings also highlights that only 1 out of 88 respondents informed that "the emphasis should be on 'enhancing' learning opportunities, rather than 'replacing' other forms of teaching and learning". Whereby, he or she provides a vast purpose of m-learning, which is not to replace but too facilitate.

In short the researcher claims that m-learning shows potential to evolve into the next generations distance learning, Garrison (1985). But the researcher is uncertain if there is a paradigm shift. Based on their data interpretation mobile gadgets is seen as an evolution of 'traditional' e-learning.

The conclusion drawn is that e-learning applications should be simplified in order for the users to use it without any restrictions. Restrictions meaning time-frame or schedule of using the application at the same time, feedback from the teacher or instructor must be swift. It also refers to on how to navigate the system without much interruption either external or internally.

Beyond doubt, m-learning is seen as an evolution of e-learning, the problem faced by the users and practitioners is not resolved yet and the technology has leaped. This is evident where m-leaning users face almost the similar issues faced by e-learning users.

In a nut shell, both journals discovered both positive and negative implication of mobile or e-learning.

The findings obtained by both authors are different in the context of area. This is evident where one journal focuses on e-learning and the other on mobile learning. Not only that, in terms of sample, there is a great difference. In which, the journal written by Haverila and Barkhi (2009), they only had 49 respondents and their samples are from software business course at Tamk University of Applied Sciences, Tampere, Finland, and the other e-learning professional course at Open University, United Kingdom.

Despite the fact that the respondents for both journals defer greatly, the core focus of the journal are similar in terms of ICT for development in education.

The findings generated from both journals are significant and relevant pertaining to the primary issues in terms of usage of communication technology for development (ICT 4D). This is evident where the journals are focusing on the effectiveness of implications in educating the society. The feedback gathered from both journals has shown a glimpse into the future. Not only that, it indirectly have gathered first-hand information from different backgrounds and interpreting the key issues faced by the society.

The government should educate the society first before conducting the project on large scale. The government can proceed by educating the future generation. This can be rationalised by providing the basic or fundamental knowledge not only to the students as well as to the teachers in schools. Rural areas in the countries must be educated on the usage of ICT so that the benefit of technology enhancement is also witnessed by them.

Teachers at preschool level must be computer literate and avoid being lethargic in using ICT during lessons. Once the preschool children are educated via technology, they would aspect a better environment in their primary, secondary as well as tertiary level.

Once the future generation is educated, the government can conduct pilot project to foresee the effectiveness of educating the society.

As all are well aware, ICT could be beneficial and at the same time cause uncountable problem to the society. When large scale projects on ICT are in progress, the government with the help of NGO's should monitor the project more seriously and at the same time make sure that no abuse of power or technology takes place.

Based on the finding of Matti Haverila and Reza Barkhi, (2009) students that have less hands-on experience using e-learning may find it difficult to navigate the system. As suggested by the researcher, a more simplified version of software must be introduced first. This would reduce frustration of students and avoid mental shutdown.

Educators and learns must use up-to-date information for a better interactive process. This is important in order to produce a positive outcome. As synchronous communication is used widely it indirectly could cause delay in obtaining feedback, its best that the facilitator or educator to be there at that particular time.

One must also bear in mind that e-learning is seen as a helping hand in teaching and learning. E-learning is not to replace an educator's role. The need of the teacher to be there during the e-learning session is vital. This because in case of confusion on a particular subject of the course and students need a detail explanation, this is where the role of a teacher is seen as most important.

The researcher also suggested that collaboration should be an important element for interactive and process-oriented course because it helps to enhance critical thinking.

Mobile learning or m-learning is an evolution in education. It is the advanced development of e-learning. Richter, Brown, and Delport (2010), in their journal focus on m-learning for distance education. A properly designed mobile learning can be spontaneous, ubiquitous and pervasive. It affords various opportunities for teaching and learning, especially interaction (two-way communication), flexibility, and maximal access, even in contrast to 'traditional' e-learning.

By implementing m-learning in the education system, one can reach out to does that are starving for knowledge. M-learning is a good method of educating the community. This is because m-learning is mobile (portable), and effortless. There is not much strain on the user. M-learning is as simple as making a telephone call. One can actually learn or gain knowledge on a particular subject with some simple instruction on the phone, for example step-by-step instruction on sending out emails.

As technology advanced in the 21st century hence, did mobile phones and computers. New and advanced software made magic in the education system as well. M-learning has evolved where applications are integrated into gadget that helps to nurture the society in a more complex environment where speed of obtaining information is at the finger tips.

M-learning is similar to e-learning but, combining both learning method would produce an education system that would disperse information faster than e-learning. Government and NGO's should take advantage of technology, they should first educate the society and at the same time conducting Research and Development (R&D) to gather data which would provide a better picture on what is really needed by the society.

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