Informatization Exploration and Research for Medical Academics

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Abstract. Informatization which is a trend of the times, has overall rise in the field of medical education, and because of the characteristics of medical education, the informatization of medical academics has its particularity. This article investigated the problems of the information technology construction in medical university, proposed a solution to solve the problem, constructed a digital campus vision system, and designed a fully functional information technology environment platform. This article provided a comprehensive educational program feasibility to promote the informatization reform process.

I. Introduction

Medical science plays as the important role in the previous changes and reforms in the world, and as the trend of development, information technology has overall rise in the field of medical science, promoted at unprecedented speed, leading the direction of the reform. The colleges have become the “leader” of education informatization since the information construction starts, because they have the special information resource, talent and technology advantages. The local colleges have achieved fruitful results in the informatization process. It showed that more than 90% colleges and universities have the internet network in education, research and office work etc. and some “985” universities have the complete internet coverage; more than 70% colleges and universities construct data center, such as unified authentication, unified portal digital campus public platform; more than 80% colleges and universities have the application and management systems on teaching, scientific research, OA etc.[1]. As a combination of medical science and education, medical academics should be the vanguard in the informatization construction but unfortunately fall behind to the general colleges and universities now, even though there are some fruitful results have been achieved by medical academics. The main reason is that the informatization process in medical academics is a little bit later than that of the general colleges and universities, and has more limitation and complicated problems.

II. The problems and solutions

A. There is a contradiction between “I know” and “I want” in the idea part

Now everyone in the medical academics knows the importance of informatization but a lot of teachers and students and the business departments, who are the user of the information construction, have the contradiction between “I know” and “I want” because of the limitation by cognitive law and the way of thinking and the specific performance as follows:
They know the importance of information technology but unfortunately they do not know what they want. In the previous surveys, many teachers and students and business departments pointed out the importance of informatization and asked the university to promote the development of informatization level urgently. But when you asked them what they want, they can just tell you some details in their daily life without the specific requirements.

Know the details does not mean know the overall of the informatization. The demand of informatization is accumulated when the users keep using the informatization products, but this demand just based on themselves, which is lack of overview point, and the users did not consider himself as a part of the academic to support the informatization process. Usually, the users’ understanding of informatization construction is not deep enough and they doubt whether the investment on informatization can get high yield, do not know the informatization system show concentration and release effects when it develops into scale and system. In this case, it can cause many department groups in the university instead of a unified department, which producing a large number of information island.

In order to solve the first contradiction, the information department of university should tell the users what informatization can provide in professional way, so give the uses a chance to choose from the “informatization menu” using their own judgment, guiding the users change from vague “I know” to clearly “I want”. For the second contradiction, the department of informatization should tell the users what the overall framework of informatization is and give users an “informatization blueprint”, leading the users to change from one-side “I want” to systematic “I know”. Therefore, the key point is to have a good construction on the top level design to solve the above two contradictions, formulating a long-term plan and short-term implementation plan in which let the users be actively involved. Otherwise, the users will be easily in “I do not know” resulting “I do not want” and then “I do not know”, which is a vicious circle we do not want to see because it is difficult to be cracked and extricated.

B. There is a contradiction between “want to construct” and “able to construct” in the network foundation part

There are two kinds of networks in the medical academics, internet and internal network, but teachers and students generally found that that it was difficult to access the network and also not convenient. The main reason is that there is a relatively big gap between what teachers and students want and the network construction, which is the contradiction between “want to construct” and “able to construct”:

In the core network field, teachers and students want to choose the internet but medical academics can only choose the intranet. Medical academy internet construction started earlier than the intranet so the network infrastructure and application resources are superior to the intranet. The time, frequency and habits which teachers and students access to the internet are better than that of the intranet. The teachers and students hope they could use the internet outside the medical academy and the public platform could be built up as a combination of the internet and the intranet in order to make work and study more convenient, so they want the internet to be the core network. As a medical academy, due to the needs of works, sometimes teachers and students have to choose the intranet as the core of the network, which is separated from the internet physically.

The teachers and students want to get resources from the intranet but the medical academy can only deploy protection system to control the network. So there is another contradiction. The protection system of the intranet makes teachers and students difficult to get the resource they want and also not easy for them to share the resource to others. In order to carry out the security regulations, medical academics have no choice and have to deploy the protection system, which makes a lot of inconvenience for teachers and students when they try to use the intranet to find something they want.

In order to solve the contradictions mentioned above, the new innovative thinking mode has to be introduced, using network classification and classified management and at the same time new technology also should be adopted. While ensuring the security requirements, we should try to carry
out the security interaction across different security classification of network at the same time to creatively fulfill the requirements of teachers and students.

C. There is contradiction between “independence” and “unity” in application resource field

Informatization comes from practice, and is also a simulation of work style and ways of thinking. In practice, the informatization devices and software could help or even replace human’s work to get high efficiency. As the result, at the very beginning of the informatization construction, different business departments should first develop their own business. But this will cause other problems such as lack of unified management, unified data standard, information resource concentration, compatible of application systems. So it is difficult to form resultant force from all the business departments. Take the personal information management as an example, there are several certification data for one person, such as network certification, One-card certification, library certification, garage certification and other different application system certification etc. This causes data redundancy, and serious “more than a few data source” problem, which causes difficulty of information statistics, maintenance, verification and is very inconvenient for teachers and students. There is a lack of resources integration, dispersed storage, like isolated information islands, so it is quite common that information is difficult to be shared. The teachers and students even do not know which kind of information resource they can get from the network. Medical academics have many different kinds of application system, large research and development time span, but decentralized management departments, lack of users, multifarious system platforms, various sources, different research standards, uneven technical architectures, unrelated certification system and difficulty to be compatible among different systems. All the problems mentioned above come from the lack of unified management during the informatization process. So we should adopt effective ways to enhance unified construction and management. But unified management will lead to the constraint in the informatization process of different departments, and cause more difficulty to the construction work, introduce negative affect to the informatization construction of various business departments, and finally play counterproductive effect on the informatization construction. However, at the very beginning it is difficult to find a scientific system covering the top design of every field unified management. So this is the special contradiction during the informatization process, which is the contradiction between “want independence” and “want unity”. The key point to solve this problem is to know the real situation of the informatization construction, find the main contradiction, have well top-design, utilize unified standard, and rely on different business departments to do the construction to fully arouse their construction enthusiasm.

III. Construction plan design

To solve the conflict problem in medical academics during informatization development process, vigorously promote the informatization construction level, and enhance the informatization reform process, this article designed a blueprint for the development of the informatization construction based on the advanced information concept and technology such as information grid[1], big data[2,3], MOOC[4,5], internet of things[6] and so on. The implementation of the “1234 project” construction scheme was also proposed in order to plan as a whole and guide the informatization construction of medical academics. This project could be a reference and basis for the informatization construction in medical academics. The “1234 project” is as follows: build one unified data center for a medical academy[7]; establish two sets of clear position, clear job division, and security interconnection network (intranet and internet); create “three platforms”: efficient and comprehensive application platform, abundant and suitable resource platform, and tightly protective security platform; build “four systems”: teaching training and management system, political and cultural system, scientific research collaboration and innovation system, and comprehensive security and service system. As shown in figure 1.
A. **One data center**

Based on the concept of big data, we will build standard regulation and security shared data center, develop encoding rules for medical academics, carry out information resources planning; integrate all kinds of data, refine the core data system to achieve “one data from one resource”; construct a public database and data interactive engine to share the information of heterogeneous database; adopt abundant data, rely on data mining to share information and provide support to the management decision.

B. **Two networks**

According to network partition and the concept of hierarchical management, we establish “two networks and three regions” basic network structure, improve intranet and internet, divide them into public, internal, confidential three logical regions to achieve “two network isolation and divide partitions according to the secret level”. As shown in figure 2.

a) **Intranet**

Intensify the construction of the intranet to achieve universal coverage and full access and the intranet is logically divided into core subnet and common subnet. The core subnet adopts information consolidated storage technology, enhance the information centralized control to realize no confidential information in terminals and individuals; as a whole interconnected internal LAN, common subnet carries all the business in the digital campus. Meanwhile, try to take advantage of the security bridge technology and achieve the information security transmission among different classification networks with different security levels

b) **Internet**

Optimize the internet infrastructure and improve the internet access speed. At the same time, build wireless network at where is not a secret area such as library, classroom, try to implement the palm campus, to realize the convenient access for all kinds of terminals.

C. **Three public platforms**

The key point is to unify authentication, portal, protection and shared resource in order to build high efficient application platforms, rich applicable resource platform, and tightly protective security platform.

a) **Application platform**

Build up the identification database for all the people in the campus, achieve the unified personal identification in different systems; establish authority standards according to personnel category, and integrate business system and information resources based on personnel permission to realize single
point sign in; provide personalized customization, and introduce information push system to realize the unified access; build station group system and university BBS, provide cloud storage services, develop instant massage software and establish information interaction platform; construct station group platform and website information management platform to achieve on-line examination and approval, and fast circulation of website information at all levels.

b) Resource platform

Develop a scientific plan for the various resources of campus, introduce high-quality resources, build native resources, establish campus public resource platform and business resource platform, and set up a mechanism of sharing in order to share all kinds of resources. The public resource platform mainly includes electronic books and literature database, video database, photo database, text database and software database etc. Through the establishment of cross-database search platforms, we can realize the resource support for teachers and students in the whole campus. Business resource platform covers every business system. The teaching and training resources mainly include the network course, high-quality curriculum, micro-course, website of academic disciplines, knowledge database, etc.; political work resources mainly include administrative databases, and cadre information database, etc.; scientific research transformation resources include specific research database, and the patent database, etc.; comprehensive management resources mainly include the financial management database, and barracks database etc.

c) Security platform

Security protection and technical inspection system will be the first two parts need to be constructed in order to establish the safe, risk under control, traceable safety protection platform. The existing network protection system should be upgraded to enhance the capacity of information control and disaster backup to build up the three dimensional comprehensive security protection system from terminal protection to vulnerability scanning, from the access control to intrusion detection, from behavior audit to disaster tolerance and at the same time upgrade the technology inspection equipment, increase technology inspection intensity, improve the normalized technical inspection mechanism, and construct civil and technical inspection systems.

D. Four business systems

The goal of informatization is to reconstruct the information business process to sustain the following four information systems: teaching training and management system, politics and culture system, research collaboration and innovation system, and comprehensive support and service system.

a) Teaching training and management system

The key point of teaching training and management system is network study, teaching management, remote education and resource construction to achieve network academy project. The key part of network study platform is to establish network teaching system and open self-regulation study system, try to use electronic school bags in order to achieve network assisted teaching and network self-regulated study. The main part of teaching management platform is to unify classroom teaching management and network teaching management, to realize the unity of the training plan, evaluation standard and credit authentication. The construction of remote education platform is easy to learn, and practical and effective micro-class system can provide high quality teaching resource and enhance its ability to serve army. For the resource construction platform, high definition digital courses recording system and teaching training video real-time transmission system provide the media service to network high-quality courses to achieve remote live and recorded videos of lecture from famous teachers, conference and so on.

b) Politics and culture system

The key point of politics and culture system is electronic bulletin system and information publishing platform, in order to realize information express project. The display terminals will be installed in the main buildings in the campus to show different kinds of campus information in real-time, which will provide an economic and effective basic platform for the propaganda of medical academy. Integrated with the information interaction platform, the information release platform could be established and then we can do the centralized management and online linkage for different kinds
of medias (including website, television, broadcast, electronic bulletin) so the users could get the
campus information at anytime and anywhere.

c) Research collaboration and innovation system

The key point of the research collaboration and innovation system is the construction of research
management information platform, in order to fulfill the achievements supermarket project. Through
the establishment of unified research information database, research management information
platform can achieve the information management in the whole scientific research process and
improve the effectiveness and results of research management. Meanwhile, the system can provide
information services from research achievements, build the communication channels between
medical academics and manufactures, enhance the exhibition and propaganda of research
achievements, and promote the transformation and application of research achievements.

d) Comprehensive support and service system

The main part of the comprehensive support and service system is the one-card system and
security protection and inspection system in order to achieve safety campus project. On-card system
integrates the application of dining room repast, attendance register, book borrowing, and access
control etc. to realize one card around campus. To achieve safety campus, the security protection
systems will be installed, which include high definition camera, things network perception system,
smart management system to realize automatic alarm, automatic entrance access control, over speed
monitor and network inspection.

IV. Summary

In today’s world, informatization construction level is one of the key indicators to indicate the
comprehensive level of running the academics. This article analyzed the contradiction problems
facing by medical academics during the informatization process, proposed a solution to the problems
and the construction of digital campus, designed a relaxed, easy to access, abundant resources, and
professional service platform. A feasible plan was proposed to achieve informatization construction
leapfrog development, promote the reform of informatization, and improve the comprehensive ability
of running the academics. I expect to truly inspire the students’ learning passion, teaching, authority
management and then achieve the “informatization dream” of the teachers and students.

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