



WAVE OF ADVANCEMENT CAUSED DUE TO TECHNOLOGY

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Abstract

Present day technology has caused massive improvements in multiple fields of works including the medical field. This research paper mainly concentrates on simulations, modelling and computational systems, their working models. The paper also compares the three technologies on the basis of their uses in the medical field. At last we will have a look at the conclusion obtained from the information presented in the paper.

Keywords: simulations, computational modelling, computational techniques, diagnosis, virtual patients

Introduction

In the past few years the field of medicine has drastically changed because of evolving technology. Amongst all the rising technologies this paper mainly concentrates on simulations, modelling and computational systems. As for medicine it has many subfields under it but this research paper mainly concentrates on the uses of these three technologies in the field of academics, diagnosis, and drug production.

Simulations and Computational Modeling

Simulations is a technological advancement which allows users to imitate any situation or surrounding. Now a day there are multiple software's and systems which produce simulations of different scenarios, Computational modeling is the use of computers to simulate and study complex systems using mathematics, physics and computer science. Computational modelling and simulations often work together.

Computational systems

Computational system refers to the computer system which we all use on a regular basis. A computer system has three main components: hardware, software and central processing unit (CPU). Hardware includes input and output devices example: keyboard, mouse, etc. Software is a program which helps the user carry out certain tasks or operations.

Use of these technologies in academics

Simulations and modelling can play a really important role in academics. As for theoretical knowledge simulations and modelling can be used to present certain scenarios which are written in books. The basic systems within the body, like circulatory system and digestive system can be presented using model and simulation. By using computational modelling and simulation the flow of blood cells within the body can be easily depicted in the form of a simulation. One of the other most important uses of simulations and modelling is in practical knowledge. Specimen observation and dissection is a really important part of practical knowledge in medicine but in

the past few years the availability on human specimens decreased[1], hence Models and simulations can be used to build a fake human specimen for the anatomy to be performed on. one of the main components of such type of learning is VR(Virtual reality).

Fig.2 virtual patient graph one (knowledge)

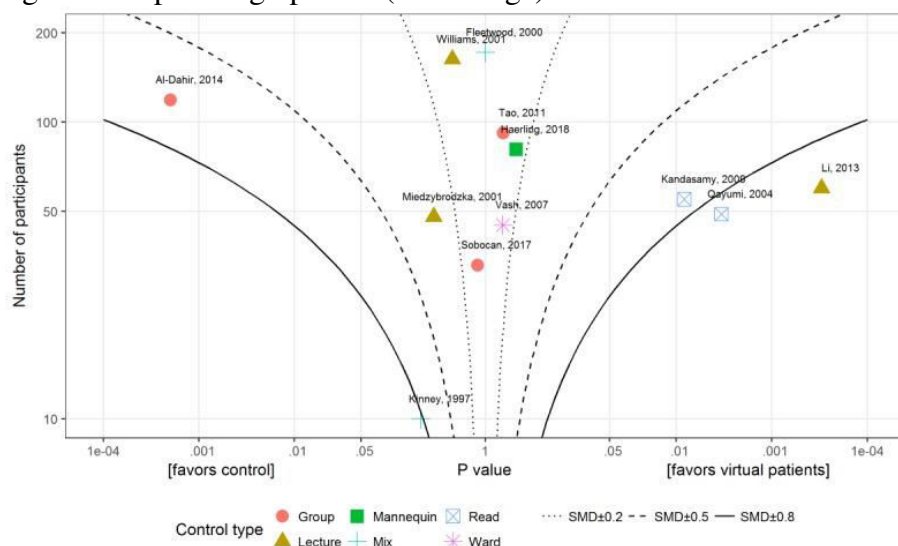
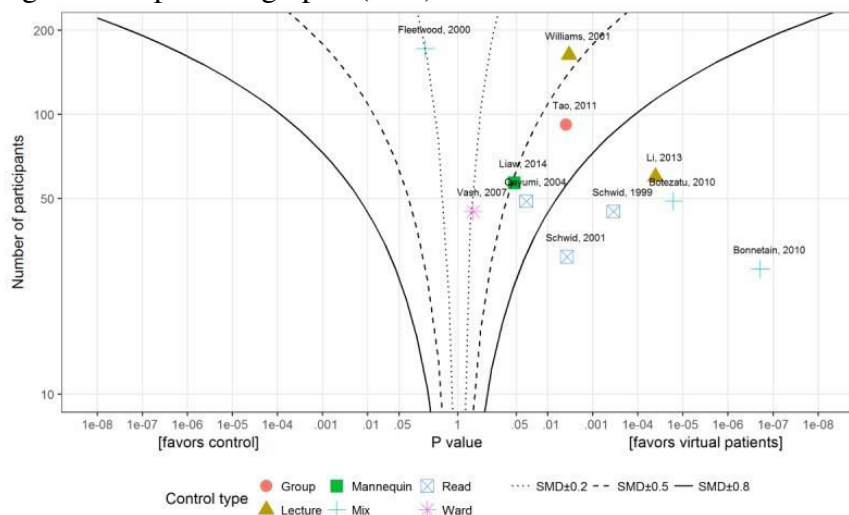


Image credit: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6632099/>

Fig.3 virtual patients graph 2(skill)



The graphs presented above are from a investigative research paper and the graphs are from the results of a survey which was conducted among medical students who were exposed to both the traditional method of learning(which is real life human specimen) and also simulation and modelling(which is VR patients). And the conclusion of the gives a suggestion that compared to traditional education virtual patients tend to be effective, with respect to development of skill as well as knowledge.[1]Computer systems can be used to store student data or exam results using some application software like access and excel. some output devices like multimedia projections can be used by students and teachers to given presentations.

Use in diagnosis

Models and simulations can be used in diagnosis to help doctors or surgeons to decide what action should be carried out next. CRIMSON is a open source software that has been in use since 2015[4]. This software uses simulations to depict the patients flow of blood. The simulation can be created from data collected from MRI scans. The same data can be used to build a model of the circulatory system of the patient. The model and simulation help the surgeons to decide and carry out the surgery. Computer systems also have multiple uses in the field of diagnosis. There many input and output devices used in medicine: X-ray machine, CT scan machine, MRI scan machine, ultrasonography etc. Apart from these devices one of the other important uses of computer systems in the use of expert system or computer assisted decision making (CMD).

Fig.4 expert system or CMD

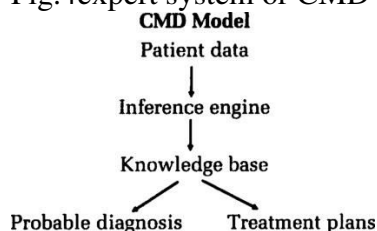


Image credit : (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6257447/>)

This system can be used in diagnosis in the following way. First the user can put the symptom in the user interface and submit it as the patient data. The inference engine refers to the knowledge base and identifies the disease with the same symptoms and the possible treatment or diagnosis for the disease is provided by the system.

Use in drug production

Drug production is an extremely time-consuming process as the drug produced must be tested multiple times to check if it fulfils its cause but with the use of these three technologies the time consumed to produce these drugs can be reduced. As mentioned in the above two subfields' simulations and models can be used to depict the region which will be affected by the drug. Using models and simulations the effectiveness of the drug can be visualised before being tested. The same CMD or expert system mentioned in the above session can be used in production of drug or suggestion of a drug. If the symptoms of a disease is entered the expert system refers to the inference engine which looks through the knowledge base and suggests which drug can be given as a possible cure for the disease.

Conclusion

The research work presented shows the advancement in medical field cause due to these three technologies. The process which were considered difficult and time consuming in the tradition methods can be done more productively and easily because of digital advancement.

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