Assignment A2:CS6460

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RESEARCH LOG

BACKGROUND

My objective is to explore pedagogy and contents in online learning that supports 21st century skills (critical thinking, problem solving, teamwork etc). The audience is a suburban population (students enrolled in my own school) in North India where literacy rate is very low. Finding and retaining qualified teachers seems to be more difficult. So I thought of online content delivery as an alternative by providing adequate infrastructure.

Last week I was more focused on finding pedagogy and e-learning tools that support a successful online course delivery. Through studies, I came to know some tools that have been successful and a broader approach to pedagogy in online teaching that align with inquiry driven, project based and constructivist approaches.

This week I was more interested in knowing how these educational technologies may also support creativity and problem-solving skills, as it is assumed that in the 21st century these will be the core skills to have.

PAPER1

Bibliographic Information

Enikő Orsolya Bereczki, Andrea Kárpáti.Technology-enhanced creativity: A multiple case study of digital technology-integration expert teachers' beliefs and practices,Thinking Skills and Creativity,

Volume 39,2021,100791, ISSN 1871-1871, https://doi.org/10.1016/j.tsc.2021.100791

https://www.sciencedirect.com/science/article/pii/S1871187121000067

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

Teachers offered some creative practices to students. teachers' epistemic belief about creativity influenced their technology-based creativity fostering practices. Participants valued the technology-based creative fostering approaches across the curriculum.

Main Takeaways

Through the study, I learned that creativity must be seen as multidimensional (for example, subject specific creativity through digital creation, stimulating creativity through communication and collaboration etc). Study supports this phenomenon that technology-based activities enhance the creativity process among students and teachers.

PAPER2

Bibliographic Information

Yalcinalp, S., & Avci, U. (2019). Creativity and emerging digital educational technologies: A systematic review. The Turkish Online Journal of Educational Technology, 18 (3), 25–45..

http://www.tojet.net/articles/v18i3/1833.pdf

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This paper is a collection of research focused on education technology and creativity. Researchers suggest that we need more research to conclude, and we need to handle curriculum development in technology related courses along with education technology in isolation.

Main Takeaways

Research concludes that educational technology and creativity has been given serious consideration in research world, but we also need to address associated factors (place, person etc).

PAPER3

Bibliographic Information

Li, Y., Kim, M., & Palkar, J. (2022). Using emerging technologies to promote creativity in education: A systematic review. *International Journal of Educational Research Open*, *3*, 100177.

https://www.sciencedirect.com/science/article/pii/S266637402200053X

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This study is also focused on impact of technology on creativity in educational settings. Using various methods (quantitative, qualitative etc) and research approaches (experimental etc) several studies took place in different settings (grade levels).

Main Takeaways

The existing studies indicate that emerging technologies have a positive impact on students' creativity effectively, particularly in interactive learning environments.

PAPER4

Bibliographic Information

Ferdig, R. E., & Kennedy, K. (2014). *Handbook of research on K-12 online and blended learning* (pp. 1-516). ETC Press.

https://www.researchgate.net/publication/324571471_Handbook_of_research_on_K-12_online_and_blended_learning_2nd_ed

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

Based on past several years of research work this handbook contains general guidelines to approach educational research and what worked and where it worked in this educational innovation paradigm

Main Takeaways

Specific to my work, this handbook suggests that technology is an important dimension when think about creativity. It must be further explored.

PAPER5

Bibliographic Information

Tang, C., Mao, S., Naumann, S. E., & Xing, Z. (2022). Improving student creativity through digital technology products: A literature review. Thinking Skills and Creativity, 44, 101032..

https://www.sciencedirect.com/science/article/abs/pii/S1871187122000359

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

61 articles were indexed by the social science citation index, objectives of this study were to understand the impact of different technologies on creativity.

Main Takeaways

We do have few evidence that technology supports creativity. However, author suggest more work to conclude.

PAPER6

Bibliographic Information

Al-Zahrani, A. M. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. British Journal of Educational Technology, 46(6), 1133-1148. doi:10.1111/bjet.12353.

https://bera-journals.onlinelibrary.wiley.com/doi/abs/10.1111/bjet.12353

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

The study aimed to investigate the impact of flipped classroom on the promotion of student's creative thinking. Using a two-group quasi experimental design, research questions (that represents creativity) was asked to students

Main Takeaways

Finding suggest that flipped classroom may promote student's creativity, especially regarding fluency, flexibility and novelty.

PAPER7

Bibliographic Information

Auttawutikula, S., Wiwitkunkasemb, K. & Smith, D. R. (2014). Use of weblogs to enhance group learning and design creativity amongst students at a Thai University. Innovations in Education and Teaching International, 51(4), 378-388. doi:10.1080/14703297.2013.796723.

https://www.researchgate.net/publication/262576715_Use_of_weblogs_to_enhance_group_learning_and_design_creativity_amongst_students_at_a_Thai_University

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

In this study, weblogs were used as a part of teaching environment to facilitate group learning and enhanced creativity. Some open questions and formal creative thought testing were also used to assess creativity.

Main Takeaways

Study suggest that weblogs were useful in providing an environment where student can more freely show individual creativity within an enhanced peer collectivism structure.

PAPER8

Bibliographic Information

Chang, Y-S. (2013). Student technological creativity using online problem-solving activities. International Journal of Technology and Design Education, 23, 803-816. doi:10.1007/s10798-012-9217-5. 1. https://link.springer.com/article/10.1007/s10798-012-9217-5

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

In this study a pre-test and post-test quasi-experiment was conducted with 107 fourth grade students. Objective was to investigate effects of online (web-based) creative problem-solving activities on student technological creativity.

Main Takeaways

Quantitative analysis revealed that technological creativity of the online-CPS student was better than the traditional group.

PAPER9

Bibliographic Information

Hokanson, B. (2017). Creativity and Educational Technology. In The Sixth International Conference of Educational Innovation through Technology y (EITT), 2017 (pp. 229-233). IEEE

https://www.researchgate.net/publication/323715589_Creativity_and_Educational_Technology

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This paper focuses on three threads to an understanding of creativity and educational technology: first if understanding of development of creativity in the learner. Second, how educational technology will support creativity. Third, how creativity can be developed in professional instructional design.

Main Takeaways

It is observed that development of instructional strategies or software are not straight -forward and it must be iterative process, learning and doing from past experiences. However, technology has a special role to play.

PAPER10

Bibliographic Information

Hwang, G. J., Hung, C. M. & Chen, N. S. (2013). Improving learning achievements, motivations, and problemsolving skills through peer assessment-based game development approach. Educational Technology Research & Development, 62(2), 129-145. doi:10.1007/s11423-013-9320-7. https://link.springer.com/article/10.1007/s11423-013-9320-7

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This article discusses three principles and practical advice to transform current pedagogical practices into effective online teaching.

Main Takeaways

Focus has been given to peer discussion, immediate feedback and active collaboration among students while doing activities. We should have a support system which offers these characteristics.

PAPER11

Bibliographic Information

Kim, I. (2015). Effects of learner-created digital storytelling on academic achievement, creativity and flow in higher education. Educational Technology International, 16(2), 167-181. https://files.eric.ed.gov/fulltext/EJ1126025.pdf

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

In this study, digital stories were used to check the learning material on the motivation, academic success, retention, and student's opinion. Study was carried out using mixed method approaches.

Main Takeaways

Study result showed that digital stories have positive effect on academic achievement, motivation, and retention.

PAPER12

Bibliographic Information

Liu, S.-H., & Lee, G.-G. (2013). Using a concept map knowledge management system to enhance the learning of biology. Computers & Education, 68, 105-116. doi:10.1016/j.compedu.2013.05.007.
https://www.sciencedirect.com/science/article/abs/pii/S0360131513001280

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

Study was undertaken with goal of developing a concept map knowledge management system for use as a tool in observing change in student's understanding of biology. This system should be useful in assessing student's knowledge and unique thought process.

Main Takeaways

Study shows that knowledge management system involved in computer aided instruction in the teaching of biology had a positive influence on learning effectiveness.

PAPER13

Bibliographic Information

Lloyd, P. (2013). Embedded creativity: Teaching design thinking via distance education. International Journal of Technology and Design Education, 23(3), 749-765. doi:10.1007/s10798-012-9214-8. https://link.springer.com/article/10.1007/s10798-012-9214-8

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This paper shows as how design thinking from a distance can be consciously developed and deliberately applied out the classroom.

Main Takeaways

Student and teachers' surveys indicate that the design of teaching regarding design thinking was quite successful.

PAPER14

Bibliographic Information

Mayer, R. E. (1989). Cognitive views of creativity: Creative teaching for creative learning. Contemporary Educational Psychology, 14, 203-211. doi:10.1016/0361-476X(89)90010-6.

https://www.sciencedirect.com/science/article/pii/0361476X89900106

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

In this paper three examples involving science, mathematics, and computing problems have been presented using cognitive sciences as to show how teaching and analogical models can lead to improvement in student's creativity.

Main Takeaways

Cognitive theories of transfer, mental models, and learning strategies have great potential to foster creativity if utilized in the educational technology product development

PAPER15

Bibliographic Information

Mishra, P., & The Deep-Play Research Group. (2012). Rethinking technology & creativity in the 21st century: Crayons are the future. TechTrends, 56(5), 13-16. doi:10.1007/s11528-012-0594-0. https://www.researchgate.net/publication/257693028_Rethinking_Technology_Creativity_in_the_21st_Century_Crayons_are_the_Future

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

In this article author talks about TPACK framework and how can we leverage technology in instruction to infuse creativity.

Main Takeaways

By taking example of Math, it has been shown as how hands on approach to the subject using TPACK and technology, creative exercises being implemented.

PAPER16

Bibliographic Information

Csikszentmihalyi, M. (1997). Flow and the psychology of discovery and invention. *HarperPerennial, New York*, *39*, 1-16.

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This is based on authors' experiences and work towards creativity. He defines creativity theoretically and according to him it is very much possible to be creative to any individual follows certain guidelines and practices.

Main Takeaways

Author summarize the creative process in five steps as following:

a) The first is a period of preparation, becoming immersed, consciously or not, in a set of problematic issues that are interesting and arouse curiosity.

b) The second phase is a period of incubation, during which ideas churn around below the threshold of consciousness. It is during this time that unusual connections are likely to be made.

c) The third component of the creative process is insight, when the pieces of the puzzle fall together.

d) The fourth component is evaluation, i.e., deciding whether the insight is valuable and worth pursuing. This is often the most emotionally trying part of the process, when one feels most uncertain and insecure. Is this idea really novel, or is it obvious?

e) The fifth and last component of the process is elaboration. This stage takes up the most time and involves the hardest work. After an insight occurs, one must validate it.

PAPER17

Bibliographic Information

Beghetto, R. A. (2010). Creativity in the classroom. The Cambridge handbook of creativity, 447-463.

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

Author defines the creativity and supports creativity as a key educational goal. However, according to him, creativity is a conflicted term that does not have one meaning in every context.

Main Takeaways

Author accepts that creativity is important as educational goal. However, the measurement and identification of creativity varies from school to college and from lower grade to higher grades.

PAPER18

Bibliographic Information

Beghetto, R. A. (2010). Creativity in the classroom. The Cambridge handbook of creativity, 447-463.

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

Author tries to analyse creativity from different perspective. He agrees that it can be cultivated based on context, process, and person itself

Main Takeaways

Author tries to explore the ways and factors involved in the creativity. When space, person and process of task gets aligned, it is possible to have creative outcome.

PAPER19

Bibliographic Information

Plucker, J. A., & Beghetto, R. A. (2004). Why creativity is domain general, why it looks domain specific, and why the distinction does not matter.

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This article discusses creativity in theoretical terms. The main point of discussion is whether a particular person may possess creativity in different domains, or he/she entitled to a single subject domain creativity. If multiple domain creativity possible, then under what condition?

Main Takeaways

Author suggests that creativity is not too much about being domain general or specific, instead space, time, product and process are more responsible to facilitate creativity in general conditions.

PAPER20

Bibliographic Information

Lai, E., DiCerbo, K., & Foltz, P. (2017). Skills for Today: What We Know about Teaching and Assessing Collaboration. Pearson.

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

The focus of this paper is about the importance of collaboration and teamwork in 21st century. It has been demonstrated using workplace examples. It also discusses as how can we teach this skill in schools.

Main Takeaways

Collaboration skills are associated with more effective performance at school or on the job, and are highly valued by employers.

PAPER21

BIBLIOGRAPHIC INFORMATION

Loveless, A. (2003). Creating spaces in the primary curriculum: ICT in creative subjects. The Curriculum Journal, 14(1), 5-21.

Source (Google Scholar etc)

Google Scholar

Brief Original Summary

This article focus on some frameworks that describe the creativity as an interaction between people, process, domains and wider social and cultural context.

Main Takeaways

Article suggest that ICT can be heavily utilized to bring out creativity in primary classroom given the right framework in place.

SYNTHESIS

In this research log, focus has been kept around creativity while using educational technology in teaching and learning. As stated in paper, "creativity is widely defined as an individual or gro

up process that involves the production of outcome, which is novel/original and useful in a specific social context. It is also affected by personal and environmental factors"(Csíkszentmihalyi, 1996; Plucker, Beghetto, & Dow, 2004;). Researchers generally conceptualize creativity along one or more of four Ps: person, process, product, and place (Rhodes, 1961). Student's creative development in classroom is the result of convergence of these factors.

Further, research suggest that people's creativity can be enhanced (Lai et al, 2018). Enhancement seems most effective when it is systematic, targets domain specific cognitive skills, includes opportunities for creative attitudes, involves realistic task.

Creativity using digital technologies have been supported in much research, Loveless (2003, 2007). They argue that digital technologies support higher order thinking (using imagination, pursuing purpose, being original etc) and creative activities that includes, developing ideas, making connections, creating, and making collaboration, and communication and evaluation of creative outcomes. Studies suggest that electronic collaboration and communication may affect creativity (Chen & Chiu, 2016). There is collection of research on different technology and its impact of different level of creativity in specific subject (Serpil et al, 2019). Such studies also suggest that the 3D design increased high school student's design and engineering skills (Chang, 2014; Chang, Chen & Chou, 2019).

To understand the impact of technology on creativity, few studies suggest TIM model as a framework that is focused on planning, describing, and evaluating technology integration (Harmes et al., 2016). So, overall creativity is well supported using digital technologies in the classroom. More subject-wise (Mishra et al., 2018) research is needed to have more clarity as what kind of technology

and for which specific subject is required to bring transformational changes at class level.

Simultaneously educational technology (depending on context and subject) improves the thinking skills, engagement, and retention among students (Lui et al., 2013; Kim, 2015). Recent research on cognitive sciences (Mayer, 2020) has great potential in development of appropriate educational technology focused on creativity and thinking skills.

REFLECTION

This week I had difficulty in finding the papers relevant to my interest. I was looking for connections between educational technology & creativity and educational technology & problem solving in the k12 classroom setting. In process of finding the papers, I found technology enhanced creativity by Eniko Andrea, that is collection of similar research, and I explored the associated bibliography. Going through the research papers I realized that there is strong positive corelation between creativity and technology, but the context and subject matter is still a missing link.

PLANNING

Moving ahead I will narrow down my research topic and I will be more focused in biology k12 course contents. My objective would be to explore how teaching of biology can be made a hands-on team project. So, my focus of research would revolve around three pillars namely, a) understanding of the topic (using visualization) b) hands on lab work (through simulation) and then c) group or individual presentation concluding the topic. These instructional strategies will be guided by constructivism, where creativity is a natural process.

ACTIVITY

BACKGROUND

In India there is huge population (around 65%) residing in villages that do not have adequate infrastructure (India Today) to support quality education and health facilities. Schools are run by one or two teachers (business today, UNESCO Report 2021, Quartz) catering to hundreds of students from nearby villages. In the absence of basic facilities, qualified teachers are not willing to work in these schools and local teachers (in the absence of professional training) usually do not have expertise (Tribune India) in the delivery of course contents that greatly hampers the quality teaching and learning (Tribune India).

In the similar setting I am also running a private state affiliated k12 school. Except the smart board in every classroom and high-speed internet, we do have decent facilities (like whiteboard, drinking water and other basic infrastructure) that is required for smooth running of the school. But as I said in above paragraph, scarcity of qualified teachers is a major problem in this school too.

GENERAL PROBLEM STATEMENT

To remove this barrier towards quality teaching and learning, we can utilize educational technology as an alternative. There are few initiatives (E-Vidyaloka , Diksha , E-Vidyalaya etc) have been taken by the government. In these initiatives some volunteer expert teachers offer e-lectures to rural schools. There is an organization called Grammonati, who provides curated video lectures (prepared by educational company) for each subject in the absence of teachers.

With similar objectives, we have thought to integrate educational technology (for better content delivery) in classroom that aids teachers, and in some cases, to

substitute the absent teachers in some classes. Furthermore, through the past several years of research in education we realized that only rote learning or passive lecture delivery won't be sufficient in 21st century. Critical thinking, problem solving, and creativity are some important qualities to have in future and it requires student to be an active learner, means they enquire and create new knowledge for themselves based on the given facts and data. So, it is utmost necessity to enquire as how these recent advancement in education technology can support such endeavour. So, in this project my idea would be to provide students the course content using multimedia and at the same time motivate them towards creativity using technology enhanced curriculum.

SCHOLARLY SUPPORT

As per UNESCO 2021 report, India has a deficit of over 1 million schoolteachers mostly in rural areas and it badly affects the teaching and learning process (UNESCO, 2021; Varun, 2021; Ananya et al., 2022). The low quality of education (Prema, 2022) is a major problem towards utilizing youth's potential. Reports are not entirely negative but when looking at enrolment rate of about 95% over past 15 years (Prema, 2022) shows the motivation for learning among rural youth and then it is of utmost necessity that we work on educational quality (Prema et al, 2018). At few places, experimental approach related to digital technologies (Prema et al, 2018) indicates that effective use of multimedia has great potential in transforming educational landscape in coming 10-15 years.

SPECIFIC PROBLEM STATEMENT

Given a multitude of problems (as mentioned in the background) responsible for such a scenario, my project topic would revolve around the problem of effective content delivery in biology class at rural k12 classroom.

CLOSING REMARKS

In 2015 It was reported by NDTV, one of the leading news channels in India that about 25 percent India's children in class 8 can't read text prescribed for class 2 and same challenges remains with Math (mostly targeted to rural population). In the past 8 years, things have changed rapidly but problem still exists. Low literacy compounds the daily life problems in terms of employment, health, political participation, awareness of their lawful rights.

In the recent years, rapid growth in mobile and educational technology equipped with high-speed internet may be utilized as rescue. By using e-learning platforms we can improve the literacy rate. For doing this we have two options; 1) if expert teachers from cities can volunteer their time (for teachers' professional development and by taking classes online) 2) we can provide video-based lectures. Then in the long term, it will have following benefits to the concerned villages and hence the nation's prosperity:

a) Education opens new door to information and technology that enables an individual to make right decision in personal and professional life (India Brand Equity Foundation).

b) Literacy is directly associated with socio-economic growth of any country (Vaman 2018).

c) Literacy is also inversely associated with country population (Vaman 2018), and if we have population under control, then resource allocation will be better.

RESEARCH QUESTIONS

This study is expected to be an experimental work where we will use survey, interview given some questionnaire to understand the student's engagement

level, problem solving approach and creativity in doing the coursework. Post experiment, impact will be measured for the used technology for the chosen subject.

At this point, we have decided to teach biology class (chapter named human muscular system). Chapter shall be delivered using interactive video simulation and video lectures on e-learning platform. Following research questions should be considered, which will be targeted to measure the learning outcome in terms of their creativity, problem solving and thinking skills:

1. Do the video lectures and virtual labs help in deepening student's understanding on the topic and the problem-solving skills?

2. Are the students able to distinguish different human parts and its working looking through the videos?

Complexity

Question delves into ability of interactive 3D video, whether it is helpful to student in making clear understanding of working relationships of different body parts. Answer can not be simply yes or no, given the interdependence of parts to each other in whole working system.

Arguability

In medical science, practices are mostly based on accuracy and timing of diagnosis, so current and past medical data of patients plays a major role.

Expected Answer

Effectiveness of video can be measured against the established practices in medical sciences. In medical research, it is evident as which part affect the other parts and how do they fit together.

3. Are the students able to understand what causes muscle pain in body through the videos?

Complexity

Question delves into videos' capability whether it is helpful to students comparing the previous video (without any difficult) with new video (having difficulty) and be able to identify the source of problem.

Arguability

Comparison of pre and post medical data can lead to a conclusion about the problem. Best medical practices can guide us in moving forward.

Expected Answer

Along with visuals of certain body part and associated joints and its verification through available medical data would guide us towards the solution.

4. Are the students able to simulate the different parts of body and come up with solution to overcome muscle pain or broken joint using virtual labs?

Complexity

Questions further delves into capabilities of virtual labs that after identifying the issue with the help of videos, do the virtual labs offer the degree of accuracy, user friendliness and facilitate an easy to work solution approach. It must be able to provide us immediate feedback if everything worked out correctly. If not, then why not?

Arguability

It would be about software performance. How much reliable diagnosis we are getting in the past and how much appreciation it has received by the end client (given in medical data).

Expected Answer

Virtual labs software must represent the best medical practices for given problem. If it signal us green after performing the step by step process then objective will be achieved.

REFERENCES [ACTIVITY]

1. Sana Ali (2021). India has a deficit of over 1 million school teachers: UNESCO Report. https://www.businesstoday.in/education/story/india-has-a-deficit-of-over-1-million-school-teachers-unesco-report-308683-2021-10-07

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9. Ketki, Abhinav (2015). Many of India's children can't add, can't read, reveals report. https://www.ndtv.com/india-news/many-of-indias-children-cant-add-cant-read-reveals-report-726828