



Constructive Disruption in Medical Education

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ABSTRACT

In recent years, many major innovations in healthcare and medical education have been experienced. Technology has called for a change in most of the societal norms. Critics and advocates have varying opinions toward the online education, some believe that it literary disrupts the traditional learning while others term it as an essential tool for development. Due to intricate nature of some medical topics as well as varying global privileges, most students are forced to seek information online. This has led to the emerging technologies which serve as a tool for supplementing medical education. Some institutions have come forward to make education freely accessible to third world countries through web-based programs. Most offer education through an informal approach. However, they offer certificates to their distant learner. This paper explores how online learning supplements medical learning and especially in the higher education platforms, ultimately leads to the constructive disruption, which is certainly not destructive.

Keywords: Disruption, Medical education, Online medical education, Supplementary, Constructive disruption

INTRODUCTION

The hypothesis of “disruptive innovation” was first instituted by Clayton M. Christensen [1-3]. The professor scrutinized the impacts of technology on modern learning and found it to have far-reaching dynamic impacts on the curricula. Critics view disruptive technology as unpleasant while advocates view it as a supplementary to the medical education. Medical learning in third world countries should utilize the disruptive technologies in boosting proficiency. The recent trends have shown a speedy impact on medical technology resulting in huge discrepancies between third and first world nations. One of the most utilized supplementary technologies is the massive online open courses (MOOC).

The inventions in education and medical industry serve as a supplementary tool for the customary education. Traditional education is often rigid in updating information, and hence web-based learning can help boost its performance [4]. Scholars believe that MOOCs are compatible with the traditional education [5]. The degree of profitability in medical education will highly be impacted by the compatibility between the two systems [6]. The traditional education will not be able to function without web-based learning as most publishers utilize the internet as a platform for air information [7]. Most publishers utilize the internet as a platform for air information. If MOOCs do well in the medical education, it will have a positive effect on the traditional education. However, if they have adverse effects on medical education, it will negatively impact the entire profitability [6]. In the case of third world countries, embracing technology innovations will aid in disruptive medical learning [8]. Collaborative technology like Microsoft Link, Cisco Webex, and Adobe E Connect can help offer instruction to learners at far distances [9]. These technologies will ease guidance in medical experiments as well as reduce the cost of tutoring.

Massive Online Open Courses (MOOC)

Pedagogy aims at learning the models and practices of education. It evaluates fundamental tenets that impact an individual’s methodologies of learning, tutoring, and evaluation. Several features form an effective pedagogy. The methods should carefully contemplate a learner’s views. It should be founded on instructors’ behavior, their acquaintance as well as their views. The learning method should be considered both long-term as well as short-term objectives. It should base its content on what was previously covered by learners. Also, it should involve vast techniques like group work and individual activity as well as instructional learning. It should also incorporate a learning evaluation. The method should be comprehensive and should meet learners’ needs. The MOOCs are online

courses accessed freely through the web. Currently, MOOCs are considered as advancement which was primarily introduced in 2006 and was created as a mainstream mode of erudition in 2012. Early MOOCs frequently accentuated open-get to highlights, for example, open authorizing of substance, structure and learning objectives, to advance the reuse and remixing of assets [10]. Sometime later MOOCs utilize shut licenses for their course materials while keeping up free access for understudies.

Establishment of MOOCs long originates before the sparkling contraptions and tech organizations of Silicon Valley as we see it. Online open, participatory learning biological communities picked up fame as far back as the principal decade of the 21st century, to shape what is today regarded as the Open Educational Resource (OER) movement. The OER movement is made from an assortment of the assets whose fundamental reason for existing is to broaden and wipe out boundaries of passage into instruction. A standout amongst the most unmistakable signs of these assets is the MOOC (massive open online course). The main MOOC connectivism was made in 2008 by a Canadian group of scholastics [4]. A long time later in 2011, the course artificial intelligence was propelled by Sebastian Thrun and Stanford University. The AI course, which pulled in more than 160,000 students from more than 190 nations, is viewed as the milestone MOOC which set off a time of quick development inside the ease online training industry.

By mid-2012, roughly 300,000 individuals were taking 38 courses instructed by Stanford teachers and couple of first-class colleges using the MOOC stage Coursera. Not long after, a Stanford teacher established Udacity, a stage offering free courses in the organization with universities and educators [11]. By April of that year, several campuses and colleges around the United States united with Coursera to likewise offer open modules, and in May, Harvard collaborated with M.I.T. to make a comparative wander, EdX. Formally announced so by the New York Times, 2012 was the Year of the MOOC. Since this underlying blast, the innovation just keeps on enamoring the majority.

Today, EdX, Udacity, and Coursera are the three most famous and inescapable stage suppliers. EdX was established by MIT and Harvard University in May 2012, it is a free non-benefit online college-level course supplier [12]. The stage today has 1.2 million clients and offers a mixed learning model, to incorporate an intelligent online segment. On the other hand, both Coursera and Udacity are revenue driven suppliers. Coursera was established by Andrew Ng and Daphne Koller from Stanford University in 2012 [13]. In the year under study, the stage had 2.4 million learners, taking 214 courses from 33 colleges, including 8 which are globally based. Udacity, established by Sebastian Thrun and Peter Norvig in mid-2012, had understudies in officially 203 nations by the primary summer after its beginning [14]. Their plan of action, considering the conviction that “advanced education is a fundamental human right,” expects to enable understudies over the globe.

Integration of MOOCs in Medical Education

MOOC providers have substantial amounts of medical learners' information that could prompt changes enough to replace a whole education system [15]. Specialists are isolated on whether MOOCs can enhance the general nature of advanced education in the U.S [16]. Some say the courses have effectively made a positive engraving, while others say additional time needs to go before the impacts of MOOCs can be seen in on the web and physical classrooms [17]. Scholars argue that there is little information regarding whether MOOCs are more compelling than other learning models. Also, they add that they don't comprehend why individuals are maintaining a strategic distance from them. So, they accept there is some proof that MOOCs have started to have a positive impact in on-grounds classrooms. The MOOC build-up has made educators re-examine how they approach their instructing. In on-grounds classes with online parts, known as mixed classes, educators are following in the strides of MOOC pioneers by isolating their addresses into short fragments, giving more successive evaluations and giving more chances to critical thinking exercises that have demonstrated compelling in enhancing the medical learning execution. It is evident that online instruction could bring down the cost of a degree [18]. According to specialists, educators are utilizing MOOC materials to supplement their courses. In mixed classrooms, college courses can use the energy of MOOCs to free up classroom time for intelligent joint effort and knowledge evaluation. Instructors have identified higher passing rates in MOOC courses than the customary courses.

Some trainers hold that MOOC suppliers can enhance information acquaintance to medical learners. They also term it early to do inquire about how individuals learn in MOOC conditions and some of that exploration will give direction on the best way to structure and arrange what will as of now be astounding substance. The EdX partly ventures in considering how understudies learn as well as how innovation can change learning [12]. Others contend that

MOOCs can help educators effectively figure out how to utilize peer evaluating, a mainstream MOOC procedure in which understudies are surveyed by each other [19]. Similarly, MOOCs aid educators how to deal with a worldwide classroom. The contemporary situation calls why global understudies should seriously think about MOOCs [16]. Web learning associations hold that MOOCs will be globally assimilated in the next one decade.

These studies and mishaps for MOOC advocates require not be disastrous to the capability of MOOCs. A MOOC-empowered scene postures diverse dangers and open doors for various players. Tip top, foundations give off an impression of being put forth MOOCs to a limited extent as an investigation, group engagement and to some degree as a tester to recognize and pull in brilliant understudies for their formal degree programs. Non-world class enrolling foundations are additionally utilizing MOOCs to pull in understudies, to mix new material and instructional method into existing projects and to make credit pathways into their degrees by perceiving earlier achievement [20]. In the two cases, the tester or program advertiser expands well past the degree-searcher showcase. This goes some approach to clarifying the high dropout rates for MOOCs and demonstrates which does not speak to the sort of wastage or quality issue typically connected with the high steady loss [21].

Pros of Online Integrated Curriculum

The online integrated curriculum has far-reaching benefits. The proponents of complementary learning have a positive attitude towards its implications on the medical learning. However, some scholars may term the MOOCs as dishonest since they oust the customary learning [21]. It is evident that the proponents of disruptive learning are skeptical. They have been able to conduct analysis on the incoming system as well as unearth solutions through challenging altered concepts. Skeptic instructors challenge opinions and situations regardless of the correctness of the assumptions. Still, cynic instructors may deem the systems as erroneous and thus unfit for offering medical education. This is because of their nature of distrusting information they do not concur with.

Recommendations: Instead of criticizing the new system, they expect the technology to be embraced. Instructors and learners should be open-minded in accepting the facts delivered through the web-based learning. The proponents of web-based learning should center more on making it worth to supplement the traditional education.

Cons of integrated online curriculum

The ascent of MOOC doubt skeptics in the meantime, talking chiefly from inside the colleges, have tested both the educational esteem and the unsettling capability of MOOCs. Critics raised several arguments that MOOCs are destined to cultivate a dark future for higher education [22]. Most broadly, administration master Peter Drucker anticipated in a 1997 Forbes meet that in 30 years ‘the huge college grounds will be relics. Why should this time be extraordinary? They likewise call attention to those world-class colleges, for example, Harvard doesn’t offer degrees for understudies who finish an arrangement of MOOCs, and that businesses don’t perceive MOOC testaments as expert capabilities proportional to degrees. They note too that MOOCs have no manageable plan of action: so far, they have fetched suppliers huge add up to set up, yet have earned nearly nothing. Cynics likewise comment that most MOOCs include light learner’s workloads, insignificant contact with teachers and unobtrusive appraisal errands. To wrap things up, they highlight enormous weakening rates: Completion rate of MOOC courses is only 10% compared to the high enrolment.

Possibly, a more extensive environment of non-college suppliers, working in a blended worldwide economy of higher learning, could even disassemble the colleges broadly acknowledged societal part. Over their long history, Western colleges have endeavored to position themselves as society’s main watchmen of instructing proficient and social elites, giving a master exhortation to governments, delivering revelations and advancements and duplicating “edified” national societies [23]. Such a ‘thought of the college’ supports their recommendation to governments and the sorts of social compacts, financing game plans and administrative assurances they look for. In any case, it additionally reviews what Drucker portrayed as the ‘hypothesis of the business’ in huge US organizations: a group of aggressive capacities. Drucker’s focal knowledge was that as its plan of action, association and methods for working ended up plainly organized, an attempted and tried ‘hypothesis of the business’ could lead an effective partnership to come up short. Once disguised by insiders as ‘culture,’ the agreement see counteracts early acknowledgment of the signs that outside conditions have sufficiently changed to render a “demonstrated” model out of date.

Disruptive Technology as a Supplement

Disruptive innovation is expected to interfere with the contemporary medical education. Truly disruptive devices will constrain new ways to deal with guaranteeing medical learners learning in advanced education. Technology empowers the internet which conceivably qualifies as a disruptive advancement in instruction. Weights from all sides have created a critical requirement for modification in contemporary advanced education [24]. Waning government incomes for allotment to advanced schooling. Undergraduates stressed over managing an additional round of educational cost increments. Influential from the government, commercial, and advanced learning arguing for more proficiency, greater profitability, more graduates, and more learning. At the beginning of the innovation blast, government pioneers touted innovation as an approach to mysteriously change advanced education, however simply including PCs did not realize the new advanced education so profoundly sought. However, innovation infers its conceivably disruptive power from intruding on our standard practices and arrangements. A PC embedded amongst personnel and understudies' powers workforce to contemplate what a course intends to accomplish as opposed to proceed with existing methods for planning and conveying a course. Innovation prompts an interruption in the typical idea designs, empowering reflection. In the end another comprehension of how learning happens and what a course could be developed. This hypothesis was our first figure about how and why interruption may happen. It didn't address the subject of whether disturbance has occurred in advanced schooling, or what it would seem in the event that it has.

Five years on, colleges and governments will adapt to a tradition of organizations in advanced education. It was accounted for in May 2013 that the Chinese government was looking for more ties with European institutions. At an EU-China discourse, it was said that the two sides had 'proceeded onward from for the most part encouraging understudy trades to talk about institutional-level collaboration and making joint-explore stages that would likewise incorporate accomplices from outside China and Europe.' This is reliable with the Chinese Politburo's formal arrangement, since 2010, to build up an 'advancement society' and it is elusive an Asian government that did not share an adaptation of that arrangement. A representative of the European University Association said that 'it is not just about the two sides picked up a couple of more remote understudies. It is tied in with making a worldwide design for cooperation'.

It was said to be obvious that EU arrangement producers and college pioneers had proceeded onward from their attitude of considering China to be a wellspring of expense paying understudies, and from seeing China as a contender instead of an accomplice in exploring. It would be a misstep, be that as it may, to peruse this change in outright terms. The driver inside that more extensive ethos of organizations remains rivalry. Colleges need to collaborate on content thus, the unattractive neologism 'competition.' The justifications for the last incorporates vital situating, mirroring the worries of industry and delivering graduates that fit their necessities, joint research and upgraded access to investigate financing. Some portion of the UK International Unit's command is to 'bolster the advancement and manageability of the UK advanced education division's impact and aggressiveness in a worldwide situation.

Comparison of the industrial and worldwide learning: This model develops existing exclusive foundations, adopting a Netflix strategy to revenue driven instruction, charging a month to month membership expense and inspiring positive learning results by offering what might as well be called visit student focuses and compensates. The model will convey a low boundary to the section for students around the world, and offer comprehensively perceived approval. The experience will give an exceedingly strong online stage, with adaptable and individualized expertise hole preparing. The online experience will be supplemented with intelligent gaming, to manufacture group and relational connections, a simple to customary sports and co-curricular offerings at physical colleges. The establishment will band together with enterprises, state governments, and establishments to distinguish aptitudes required in the workforces and to coordinate individual understudies with openings for work that line up with their abilities and interests.

Assessment and Credentialing: As the ascent of the substance hall and structured social work start to come to fruition, credentialing approaches in the biological learning community may develop also. Customary suppositions hid ideas like seat time, the credit hour, and even the default assumption of a brought together institutional degree program, are being addressed. Posting fruition of individual MOOCs on a person's LinkedIn and different profiles is another case of passing on accomplishments with an end goal to improve notoriety [25]. Mozilla's Open Badges activity looks to accreditation students at a more granular level of individual abilities and achievements [26]. The framework is planned as a path for members to check their abilities through a woven artwork of dependable associations. The product behind the program is open source, enabling any establishment to issue and confirm identifications on the

premise of its notoriety and assess and check the estimation of identifications issued by others.

Although the open identifications development started in K-12 and youth programs, a few schools and colleges are exploring different avenues regarding how computerized accreditations may coordinate into their current scholastic projects [26]. These rising credentialing advancements fortify and make conceivable a dependence on notoriety at the level of the person. As of now, the after-effects of a google inquiry of a planned worker are utilized to approve or increase data contained in the hopeful's application or resume. As people's past work portfolios turn out to be nittier gritty and more promptly available, one can imagine a day when these certifications may conceivably substitute for more conventional structures. While the coordination of this sort of approach would have been restrictively troublesome. However, perceivability makes it an ever-less demanding technique to utilize. Appraisal of aptitudes or appropriateness for a specific errand or occupation, especially computerized work, will turn out to be more shifted and complex than it has been previously. Those in the position of enlisting understudies and employing others should consider a more extensive exhibit of accreditations, testaments, identifications, notoriety, and different markers of appropriateness. As credentialing is a center capacity of schools and colleges, the developing option qualification pattern will be critical to track.

MOOCs have a part in global advancement. Employment in different regions is unfilled because of abilities deficiencies. Francisco Marmolejo at the World Bank brought up that in Tanzania, an activity between the University of Dar es Salaam, neighborhood organizations, the World Bank and Coursera is filling that crevice. The venture is building up IT educational programs to be available through Coursera and lined up with the necessities of the Tanzanian private division. The World Bank trusts Coursera can assume a critical part of Tanzania's instruction system. Total 118 MOOCs mirror the procedure of innovative devastation natural to private enterprise. A few employees will be lost by 2020 yet new ones, of an alternate sort, will show up. A similar interruption applies to establishments, college pioneers, scholastics, understudies and different partners. Organizations and partners have alternatives, and HE segments will be more differing-if not profoundly by 2020, at that point still more assorted. MOOCs additionally embody another part of advanced worldwide education: they are introduced to transparency, and coordinated effort yet loan themselves to wild rivalry [22]. Understudies and colleges should practice the cooperative person soul, however, all the while to separate themselves from the group and exhibit one of the kind offers. In any case, new plans of action and instructional methods are as of now rising, what's to come is mixed and unbundled.

Disruptive Innovations and Online Learning

It involves impacts of mechanical and software developments in online learning. Christensen developed the thought to apply to associations, where the disruptive advancement may neglect to meet desires of the current advances or not fulfill clients in the typical industry. Notwithstanding, businesses that utilize the disruptive innovation fulfill a specialty sector or periphery clients who esteem the innovation or the item it makes conceivable. The innovation, in the long run, surpasses the execution of earlier items and enhances to the degree that it fulfills the standard market. Firms that conduct the disruptive innovation oust the firms that still cling to the older technology. Enlistments in online projects approximated nine hundred million understudies in the dawn of 2004, around one and a half million understudies in 2005, and approximately four million out of 2007, or 7.9 out of each hundred of the aggregate medical learners' enlistment in degree-giving institutions. The number of courses that utilize the internet figuring out how to enhance medical learners or upgrade the nature of on-grounds classes cannot be assessed. However, the figure is likely high. These enlistment figures may show that web-based learning is taking advantage of another market of understudies already unfit to select, yet the number additionally definitely incorporates at present enlisted understudies who are enlarging their customary courses with web-based learning. Regardless, internet learning has not rethought the advanced education commercial center despite enlistment development rates around 20% for every year. In any case, this development and the far-reaching utilization of website materials in on-grounds assignments may be initial indications of creative interruption.

Studies indicate that many students prefer MOOCs than closed courses. Some learners prefer MOOCs because of spending additional time-on-assignment other than the strict courses [22]. MOOCs give understudies more control over their learning as well as providing more prominent open doors for personal reflection [27]. This exploration may urge more staff to investigate internet learning. We realize that the basic demonstration of educating on the web enhances workforce assessments of web site learning. While the individuals who haven't interacted with web-based

schooling view it more contrarily, the developing proof for its viability can aid retort some staff inquiries and address a few fears.

Several qualities make web-based education disruptive. For instance, the K-12 model can be boosted by the use of computers in aiding learners. The PCs can be used to complement the available courses as well as additional supplement courses [28]. Early proponents of disruptive technology identified that high enlistment in courses. There was the creation of the virtual secondary schools and the virtual science labs. The steady technology developments are expected to keep enlistments in web-based learning high. The inadequacy of medical tutor's results in most learners in developing countries opting for online learning. The changing technology serves as a big blow to the educational resources in the developing countries [29]. Most nations are not able to follow the innovation stages, and hence they opt for leapfrogging. Costs in the online study are far less compared to those of enrolling a degree course. Tweaked additionally comes about because of the blast of devices enabling understudies to create their learning schedules and look for assistance from mentoring programming.

Empowering Supplementary Innovation in Online Medical Learning

It is how PCs are utilized that makes disruptive technology conceivable in advanced medical education. The components of utilization can disturb conventional practices. Staff addresses, for instance, regardless of whether podcasts or gushing video, are yet one-way, aloof instructional models. Some scholars term them Type I employments of innovation, which robotizes or duplicates a current practice. Sort II employments of innovation enable understudies and educators to do things that weren't possible sometime recently. Their approach gives another approach to consider interruption: one innovation keeps up existing connections among workforce and understudies and while another progression these connections in major means. Terry Anderson indicated the significance of setting the medical learners at the focal point of the learning background. That implies a more noteworthy concentrate on medical learners created content, understudies' utilization of joint effort and sharing instruments, for example, Web 2.0 uses, as well as secluded mentoring. Brent Wilson additionally noticed the significance of student-focused methodologies while stressing employments of computerized direction, independently publishing, and distributed systems administration. These progressions mean we must concentrate on what numerous understudies need: more accommodation and administration, bring down cost, and more viable training [30]. It additionally implies outlining direction with the goal that understudies are urged to peruse, consider, and examine, fashion their tolerances of the material, assess their insight, and make new information.

The teaching staff has parts to play in MOOCs. Somebody needs to plan the direction, build up the self-improvement devices and course content, answer inquiries, and guide the confounded [20]. Despite everything, somebody needs to set up the learning results and plan the evaluations that will set up whether learning happened. Also, individual necessities to give a lecture on the requirements of understudies who are not very much prepared to learn on the web, the uncertain, the unpracticed, in addition to the destitute. Somebody should enable understudies to figure out how to learn, and how to do as such on the web. Somebody should be at the flip side of the association to offer help to the stranded learners.

Advanced education can burden the disruptive characteristics of web-based learning. It must be medical learners focused with learning put, to begin with, and sufficiently adaptable to oblige distinctive styles and premiums. It ought to give important backings, yet require that the medical learners take every necessary step. It must be intended to offer choices, spur understudies, and give associations with understudies' lives, employment, and groups. It must profit by the readiness of workforce and understudies to explore and fall flat, to enhance, and to keep at issues until the point when arrangements are created. Finally, advanced education should consider the negatives associated with disruptive learning.

CONCLUSION

Hence, what is the significance hypothesis of the disruption besides the apparatus that upset existing models of instructing and education indicate for the eventual fate of advanced education? To begin with, fresh programming or apparatuses marked "disruptive innovation" will be very common. It is ensured that the prospect will realize extra problematic advances. No apparatus, all alone, is probably going to deliver disturbance. Interruption takes annoying the present, concentrating on medical learners focused on getting the hang of evolving connections, honing our understanding, and outlining guideline to expand education and subordinate costs. Few devices will likely compel

a respite in our standard considering, a re-evaluation of bygone methodology, relinquishing past presumptions, and a presentation of another viewpoint that unseals another path for undertaking our labor. Genuinely inventive disturbance provoked by innovation in medical teaching will constrain us to reason in different ways, giving chances to the progressions required for web-based medical schooling to endure as well as flourish.

According to the leapfrogging theory, little and incremental advancements lead the overwhelming firm to remain ahead. Nonetheless, in some cases, radical developments will allow new firms to jump the antiquated and overwhelming firm. However, the phenomenon can find wide use in global aspects, it often occurs in institutions. Hence, the model can help in the development of medical education. It enhances sustainable disruptive technology by wiping off the obsolete technology and assimilating a new one [31]. Leapfrogging will enable the third world countries to skip some non-favorable disruptive learning stages experienced by the first world countries [32].

According to the six forces model, an analysis conducted by an organization can be used to offer an entire evaluation of cost-effectiveness and competition. The theory suggests “substitutes” as assessments concerning the obtainability of alternatives and “complementary products” as assessments on the influence of allied commodities within a select market. MOOCs and other online learning may serve as substitutes to the traditional learning [25]. For instance, a student may opt to learn through an online program instead of attending school [33]. MOOCs can offer something entirely different. However, scholars need to consider the general effectiveness of a system [34]. As soon as the risk of alternatives is high, traditional education gets limited. Potential for substitutes may escalate if the cost of swapping is low if many clients find out there are no losses in adopting the new system, then they will easily assimilate it. Additionally, new learners may consider the substitute if it offers an appealing trade-off between cost and performance regarding its products. The increase in relative value lowers the harm on cost-effectiveness. Financing in rural regions of third world countries will help to access disruptive medical education [35,36]. The recent advancement in the ICT complements the upcoming medical education and enables the global medical education providers to meet the global goal of quality in higher education. Thus, the ICT plays a role of constructive disruption, which is essential and supplementary.

DECLARATIONS

Conflict of Interest

The authors have disclosed no conflict of interest, financial or otherwise.

REFERENCES

- [1] Doherty, Iain, and Judy McKimm. “E-learning in clinical teaching.” *British Journal of Hospital Medicine*, Vol. 71, No.1, 2010, pp. 44-47.
- [2] Witthaus, Gabi R., et al. “Validation of non-formal MOOC-based learning: an analysis of assessment and recognition practices in Europe (OpenCred).” 2016.
- [3] Christensen, Clayton. *The innovator’s dilemma: when new technologies cause great firms to fail*. Harvard Business Review Press, 2013.
- [4] Gillet, Denis. “Personal learning environments as enablers for connectivist MOOCs.” *Information Technology Based Higher Education and Training (ITHET)*, 2013 International Conference on. IEEE, 2013.
- [5] Gerber, Joanna. *MOOCs: Innovation, disruption and instructional leadership in higher education*. University of California, Los Angeles, 2014.
- [6] Dennis, Marguerite. “The impact of MOOCs on higher education.” *College and University*, Vol. 88, No. 2, 2012, pp. 24.
- [7] Marginson, Simon. “Global, multiple and engaged: Has the ‘Idea of a University’ changed in the era of the global knowledge economy.” *Fifth International Workshop on Higher Education Reforms, The Internationalization of Higher Education and Higher Education Reforms*, 2008.
- [8] Lucas, Henry. “Information and communications technology for future health systems in developing countries.” *Social Science and Medicine*, Vol. 66, No. 10, 2008, pp. 2122-32.
- [9] Gagnon, Marie-Pierre, et al. “Interventions for promoting information and communication technologies adoption in healthcare professionals.” *The Cochrane Library*, 2009.

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- [10] Sinha, Tanmay, et al. "Your click decides your fate: Inferring information processing and attrition behavior from MOOC video clickstream interactions." *arXiv preprint arXiv*, Vol. 1407, No. 7131, 2014.
- [11] Kim, Juho, et al. "Understanding in-video dropouts and interaction peaks in online lecture videos." Proceedings of the first ACM conference on Learning@ scale conference. ACM, 2014.
- [12] Breslow, Lori, et al. "Studying learning in the worldwide classroom: Research into edX's first MOOC." *Research and Practice in Assessment*, Vol. 8, 2013.
- [13] Ho, Andrew Dean, et al. "HarvardX and MITx: The first year of open online courses, fall 2012-summer 2013." 2014.
- [14] Shirky, C. "Napster, Udacity, and the academy." 2012.
- [15] Davidson, Lindsay. Educational innovation in an undergraduate medical course: Implementation of a blended e-learning, team-based learning model. Diss, 2009.
- [16] Waldrop, M. Mitchell. "Massive open online courses, aka MOOCs, transform higher education and science." 2014.
- [17] Sharrock, Geoff. "Making sense of the MOOCs debate." *Journal of Higher Education Policy and Management*, Vol. 37, No. 5, 2015, pp. 597-609.
- [18] Salmon, Gilly. E-activities: The key to active online learning. Routledge, 2013.
- [19] Moore, Michael Grahame. "Independent learning, MOOCs, and the open badges infrastructure." 2013, pp. 75-76.
- [20] Ferguson, Rebecca, and Mike Sharples. "Innovative pedagogy at massive scale: teaching and learning in MOOCs." European Conference on Technology Enhanced Learning. Springer, Cham, 2014.
- [21] Yang, Diyi, et al. "Turn on, tune in, drop out: Anticipating student dropouts in massive open online courses." *Proceedings of the 2013 NIPS Data-driven education workshop*, Vol. 11, 2013.
- [22] Perna, Laura W., et al. "Moving through MOOCs: Understanding the progression of users in massive open online courses." *Educational Researcher*, Vol. 43, No. 9, 2014, pp. 421-32.
- [23] Santiago, Paulo, et al. Tertiary education for the knowledge society. Vol. 1. Paris: OECD, 2008.
- [24] DeBoer, Jennifer, et al. "Changing "course" reconceptualizing educational variables for massive open online courses." *Educational Researcher*, Vol. 43, No. 2, 2014, pp. 74-84.
- [25] Friedman, Linda Weiser, and Hershey H. Friedman. "Using social media technologies to enhance online learning." *Journal of Educators Online*, Vol. 10, No.1, 2013.
- [26] Veletsianos, George, Amy Collier, and Emily Schneider. "Digging deeper into learners' experiences in MOOCs: Participation in social networks outside of MOOCs, notetaking and contexts surrounding content consumption." *British Journal of Educational Technology*, Vol. 46, No. 3, 2015, pp. 570-87.
- [27] Clow, Doug. "MOOCs and the funnel of participation." *Proceedings of the Third International Conference on Learning Analytics and Knowledge*, 2013.
- [28] Blin, Françoise, and Morag Munro. "Why hasn't technology disrupted academics' teaching practices? Understanding resistance to change through the lens of activity theory." *Computers and Education*, Vol. 50, No. 2, 2008, pp. 475-90.
- [29] Nana-Sinkam, A. Education Technology in the International Context: A Critical Analysis of Massive Open Online: Course Innovation in Sub-Saharan Africa. Diss. Master thesis. Stanford University: Department of Communication: Stanford, CA, USA, 2014.
- [30] Belleflamme, Paul, and Julien Jacqmin. "An economic appraisal of MOOC platforms: business models and impacts on higher education." *CESifo Economic Studies*, Vol. 62, No. 1, 2016, pp. 148-69.
- [31] Li, Peilin. "Innovation in higher education: the effectiveness of disruptive technology in e-learning." 2017.

- [32] Liyanagunawardena, Tharindu R., Shirley Williams, and Andrew Alexander Adams. "The impact and reach of MOOCs: A developing countries' perspective." *eLearning Papers*, 2014, pp. 38-46.
- [33] Suen, Hoi K. "Peer assessment for massive open online courses (MOOCs)." *The International Review of Research in Open and Distributed Learning*, Vol. 15, No. 3, 2014.
- [34] Rosewell, Jonathan, and Darco Jansen. "The OpenupEd quality label: benchmarks for MOOCs." *The International Journal for Innovation and Quality in Learning*, Vol. 2, No. 3, 2014, pp. 88-100.
- [35] Sargeant, Joan M. "Medical education for rural areas: Opportunities and challenges for information and communications technologies." *Journal of Postgraduate Medicine*, Vol. 51, No. 4, 2005, p. 301.