



3D PRINTING ETHICAL PERSPECTIVES ON NURSING SCIENCE: AN INTEGRATIVE LITERATURE REVIEW

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Abstract:

3D printing has revolutionized healthcare in particular to medical and nursing sciences. 3D printing often uses additive manufacturing. 3D printing could transform nursing education, research, and caring encounters using new technologies raise ethical difficulties and non-implementing policies to a model development and innovations. This study focuses on the literature review of ethical undertaking of 3D printing in nursing science. It uses the framework of Knaff and Whittemore (2005) on Integrative literature reviews using PRISMA as illustration of analysis. Proquest, Elsevier, Hindawi, CINAHL, PubMed, Medline Plus, and Ebsco searched 3D printing ethical research. "3D Printing," "Ethics in 3D Printing," "Prototyping," and "Rapid Manufacturing" were searched for 2010 English articles. Eight studies were identified and determined relevant to this literature review. This study also discussed merging empirical and theoretical reporting, and documentation assessed policy. Focused group discussions and Roundtable Discussions tied it to current Intellectual Property Rights printing law and 3rd printing ethics. Study review experts/validators' matrix and selection criteria formed a rubric. Members checking were facilitated. Results recommended assessment of nursing encounter on the use of 3D printing technologies, their knowledge and awareness are both vital. Also, this may be served as platform institutionally to create a model, program and reconstitute a particular policy to ensure ethical conformation to the nursing science whether in education, service and community nursing works.

Keywords: Ethical Practice, 3D Printing, Integrative Review, Nursing Science

Introduction

The emergence of 3D printing technology has transformed several sectors, including healthcare. In 3D printing, it is commonly known for additive manufacturing in the practice and industry. These are materials layered to produced three dimensions. The items and characteristics are based on the computer blueprints. 3D printing has the power to change patient care, instruction, and research in the field of nursing science. But like with any new technology,

there are ethical issues that come up as it develops. Depending on the replica item, manufacturers may employ different intellectual property rights (Vincent, 2014).

Numerous prospects exist for the application of technology in the health care workforce and more so in nursing practice, including the ability to customize medical equipment, product simulations, prostheses, surgical apparatus and equipment's anatomical models. Beyond the advantages it offers, 3D printing in nursing has ethical ramifications. In their insightful examination of the legal and ethical implications of additive manufacturing, Chua, Yeong, and Lim (2017) presented a picture of the Singaporean landscape. It emphasized the significance of ethical concerns linked to intellectual property, product safety, and possible abuse while also underlining the necessity for regulatory and legal frameworks to navigate the difficulties presented by 3D printing technology.

Impacts on safety for patients and healthcare quality are among the most important ethical issues. It is crucial to ensure the effectiveness, toughness, and compliance with regulatory criteria of any medical equipment produced using 3D printing because these devices may be made specifically for a patient. Health care professionals and practitioners are challenged to ensure ethical practice effectively delivered. Also, accountabilities to this practice engagement in the clinical industry are evidently challenging as well. There are possible threats that the practice may be substandard and even defective items may hurt patients 'conditions or worsen if case. In their study, Vaz and Kumar (2021) came to the conclusion that the main advantages of adopting 3D printing technology in the pharmaceutical business were its quick production speed, cost-effectiveness, and capacity for creating variable formulations. In order to create the best 3D printer suited for use within a business, it is furthermore crucial to weigh the benefits and drawbacks of various platforms within a hospital environment.

More so, 3D printing are essential to consider the ethical aspects not only in the professional minds but also of intellectual ownership and data privacy. While using information about patients for 3D printing raises problems regarding privacy, permission, and data handling, the manufacture of patented medical equipment causes challenges with maintaining intellectual property rights. The proper and adequate formation and application of 3D printing using technologies is essential to be determined in physiological and medical and nursing sciences requires careful demonstrate of effective measures and evaluation scheme of these ethical issues. The area of anatomy and the medical sciences will profit from the increased trust that this investigation fosters among donors, anatomy schools, and the general public toward donated bodies (Cornwall, 2016).

3D printing in nursing science may possesses unique characteristics in demonstrating ethical issues. Neely (2015) argues that it's critical to strike a balance between consumer protection and individual autonomy while taking safety issues into account. In resolving rights-related concerns, it is crucial to strike a balance between protecting intellectual property rights and encouraging innovation.

Many significant issues are brought up and determined by ethical viewpoints on 3D printing and use of technologies in the Philippines' nursing science area and more so in nursing

practice. Ensuring the welfare and safety of patients is a crucial component. While individualized medical equipment and surgical prostheses may be made using 3D printing, this technology also raises concerns about quality assurance and regulation monitoring. The precision, reliability, and dependability of 3D-printed medical commodities are raising ethical questions. Ibang et.al. (2023) note that the use of 3D printing in the healthcare sector raises a number of ethical issues that need to be addressed.

Therefore, the goal of this integrative review was to fill in this information gap. The ethical requirements of 3D printing within nursing science will be comprehended holistically by looking at pertinent literature from several disciplines, including nursing ethics, biomedical ethics, and technological ethics.

In order to help healthcare professionals, academics, and policymakers navigate the ethical problems posed by 3D printing in nursing, the review's results will help build ethical guidelines, regulations, and best practices. This review aimed to encourage the ethical and responsible incorporation of 3D printing technology in nursing practice, education, and research by critically assessing the present state of knowledge and highlighting topics for further study. This research engaged to identify the ethical perspective of 3D printing be perceived in terms of review of literature and studies. It also outlined the analysis on the existing laws regarding intellectual property rights in the Philippines be described in terms of its implementation and enforcement. Lastly, implication of this study in the current law on Intellectual Property Rights printing considering the ethical perspectives of 3D printing to nursing science.

Methodology

This study reviewed studies integratively. Integrative literature reviews synthesize knowledge and apply major study results to practice. It also collects empirical or theoretical literature to better understand a phenomenon or healthcare issue (Grant and Booth, 2009). Thus, integrative reviews can improve engineering, health, medical, nursing, research, practice, teacher education, business, data knowledge and analytics, and policy activities. Integrative reviews summarize the science, advance theory, and inform practice and policy. This technique describes an integrative review's phases and important considerations.

As many know, integrative literature reviews evaluate, critique, and synthesize representative literature on a topic to create new frameworks and viewpoints. A systematic review answers research concerns, gaps and issues by gathering, analyzing, interpreting and summarizing all empirical relevant. These data shall conform to the pre-specified eligibility criteria and not as meta-analysis. A meta-analysis implies the use of statistical tools to summarize these findings. Integrative literature reviews can lack rigor, accuracy, and bias due to the complexity of merging many techniques. Poor analysis, synthesis, and conclusion methods persist. Mixing empirical and theoretical data (Whittemore and Knafl, 2005). To compare systematic and integrative reviews.

The study reviewed literature and studies on 3D printing ethics. 3D printing ethics are rarely discussed, especially in the Philippines, where piracy is common. PRISMA literature is a

strategy to scheme study review. PRISMA is an evidence-based reporting minimum for systematic reviews and meta-analyses. PRISMA is intended to present systematic reviews of randomized trials, but it can also be used for other forms of research, particularly intervention evaluations. This study used PRISMA to conduct an integrative review using meta-analysis and synthesis. Proquest, Elsevier, Hindawi, CINAHL, PubMed, Medline Plus, and Ebsco searched for 3D printing ethics studies. "3D Printing," "Ethics in 3D Printing," "Ethics in Prototyping," and "Ethics in Rapid Manufacturing" were used to find articles in English from 2010. In 2005, Whittemore and Knafl discussed merging empirical and theoretical reporting. Documentary analysis included policy assessment. Focus Group Discussion (FGD) and Round Table Discussions were used to relate it to current Intellectual Property Rights printing law and 3rd printing ethics. The matrix and selection criteria of study review experts/validators were used to create a rubric. These professionals were picked for their technological research experience. This study's selection criteria included consent from article authors.

Results and Discussions

I. Ethical perspective of 3d printing be perceived in terms of review of literature and studies.

The databases yielded 186 studies. These publications included 62 studies. These research' data were arranged by themes, highlighting similarities and contrasts. Eight studies met all guidelines and findings for this study after a more thorough assessment. Belgium, New Zealand, Poland, Australia, UK, and US provided these research, reports, and instances.

Table 1: Stages of Review

Analysis and synthesis of data extraction base on the classified articles be described using the Whittermore and Knalf approach (2005) of integrative review.

Stage of Review	Illustrations a Descriptions
Problem Identification	The Additive Manufacturing and Prototyping community has used 3D printing for years, despite its legitimacy. Science can establish when the mind no longer functions socially. Though the increase in poor ethical conduct of 3D printing is universal and affects the life and wellbeing of the affected person, family, and community at large, geographically and politically, some factors draw the line between whose authority to control one's freedom and whose intelligence can decide whether someone cannot exist to enjoy that freedom. Therefore, literature, theories, proven and well-tested studies, laws, policies, jurisprudence, statutes, records, databases, and all sources available to explain the ethical perspectives of 3D printing to a person should be sought, along with the underlying laws mandated to some states, countries, and territories on this issue..
Literature Search	The keywords "3D Printing," "Ethics in 3D Printing," "Ethics in

	Prototyping," and "Ethics in Rapid Manufacturing" were searched from known 3D printing studies databases like Proquest, Elsevier Hindawi, CINAHL, PubMed, Medline Plus, Ebsco from 2010 to 2020 to find as many recent studies as possible. Using the keywords, 186 full-text studies were obtained. After a more detailed analysis of the papers and articles, it was reduced to 62 and then to 8 after a critical evaluation.
Data Evaluation	The 8 downloadable studies that meet this integrative review were carefully read, examined for additional fitness, then compared and contrasted without deviating from the fundamental problem.
Data Analysis	The 8 research on 3D printing and ethics differ in methodologies, sample, data treatment, outcomes, and most importantly findings, but they share a focus. They discussed outcomes and laws and policies in each state and country where these studies were enacted. Belgium, New Zealand, Poland, Australia, UK, and US. Each study was reviewed, reread, synthesized, and examined for correctness to see if it addressed the topic. Comparing it to other research and papers in the same context but without the findings requested by this integrative review was another quality check for validity and reliability.
Presentation	This integrative review presented distinct 3D printing practices and laws of different countries by narrating each study. Improves quick manufacturing and prototyping professional practice.

Although each of the eight studies on ethical 3D printing has a unique methodology, sample, data handling, outcomes, and, most crucially, findings, they all have one thing in common: a concentration. They talked about the results, as well as the laws and regulations, in each country and state where these studies had been carried out. In order to determine whether or not the studies addressed the issue, each one was read over, reread, analyzed, and checked for accuracy. As a result, the investigation revealed that only a limited number of papers concerning the ethical implications of 3D printing have been published. The lack of ethical protocols is a problem with prototyping and rapid manufacturing.

Figure 2: Search Flow Process

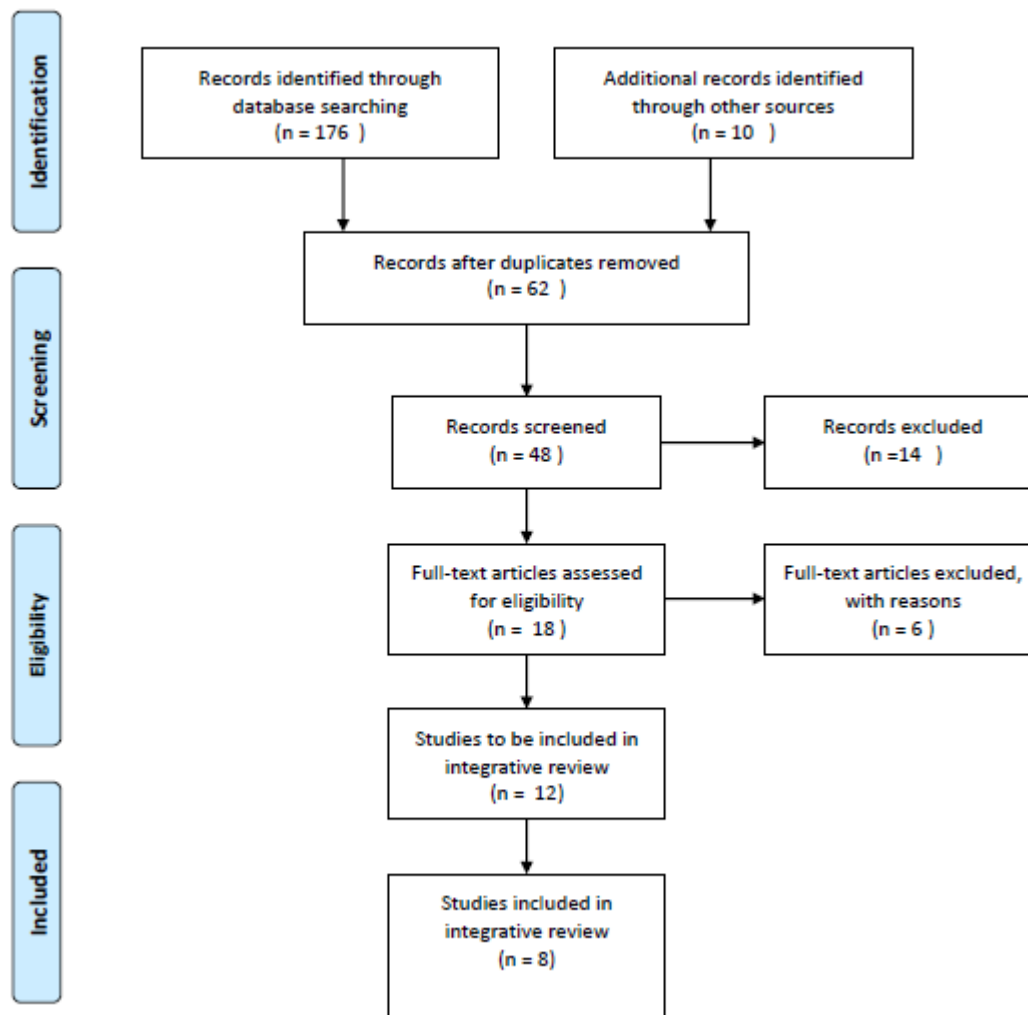


Table 2: Study Profile (n=8)

Author, Year, Site	Purpose, Sampling and Instrument	Design, Treatment of Data	Significant Findings
Mihalis Kritikos, 2018, Belgium	This In-depth Analysis shows how medical and enhancement 3D printing and technical changes may affect the EU legislative framework. Data samples. Literature and research.	In-depth Analysis, Qualitative Data thru situational profiling	This analysis also provides a series of overarching recommendations for EU actors dealing with 3D bio-printing, based on an examination of the multiple ethical and legal challenges

			associated with this emerging technology and a scan of current legislation.
Jon Cornwall, 2016, New Zealand	There is currently very little information accessible regarding the ethical concerns raised by the 3D printing of body parts for educational and scientific purposes, such as anatomy. Convenience Store Attempts. Guided Questions for the Interview.	Concept Analysis, Qualitative Data thru experts interviews	"Responsible and ethical practice" protects body donation programs and altruistic donors. If 3D printing can mimic the body, perhaps donor forms should include informed permission by default, unless evidence says otherwise.
Jan Witowski · Mateusz Sitkowski · Tomasz Zuzak · Jasmine Coles-Black · Jason Chuen · Piotr Major · Michał Pędziwiatr ¹ , 2018, Poland	As 3D printing (3DP) in medicine matures, lack of clinical proof is becoming a barrier. Clinical trials in 3DP, a rapidly growing field of research, will be reviewed. Surveyed 15 global primary registries, including ClinicalTrials.gov. This review includes all clinical 3DP trials. We searched December 15, 2017. Extractions included research goal, inclusion criteria, number of patients enrolled, primary outcomes, centers,	Clinical Trials, Experimental	Case reports, feasibility studies, and technical reports have led to larger studies. Few countries register. 3D printing may help new fields, but only specialized ones. applications.

	start and expected completion dates.		
Slaviana Pavlovich, 2016, United Kingdom	My objective is to investigate the moral and ethical implications of 3D printing, a new technology and paradoxically a new phenomenon of the twenty-first century. Guided Interview Questions. Data Samples	Situational Analysis, Qualitative Approach	3D bioprinted organs and tissues are problematic because society may perceive them as servants or masters. Doctors may shift their attitude toward patients by employing 3D bioprinted organs and tissues as needed, taking responsibility from patients. 3D bioprinting may have long-term social and psychological effects. According to Pete Basiliere, an expert at a renowned information technology research business, 3D printing might cost at least \$100 billion in intellectual property theft by 2018. I want to study the economic, psychological, and social effects of 3D printing technologies to determine who will produce them and who will have the right to 3D bioprint.
ROSHNI KHUNTI, 2018, United	After the Syrian Civil War destroyed the	Historical Analysis	This article reveals four ways the

Kingdom	arch, IDA built three copies in New York, London, and Dubai. The author examines their ethical implications. Past data.		restored arch failed. First, it ignores Palmyra's victims and the Assad regime. Second, the reconstructed arch is inaccurate. Third, the IDA patents the arch, restricting public and digital access. Finally, the reconstruction encourages irresponsibly reconstructing lost heritage without considering context or current demands. Pandora's Box highlights ethical issues with digital reconstructions of history that should be addressed in formal ethics norms for safeguarding legacy represented by historical artifacts and sites.
Matthew Walker, Joseph Banks, 2018, London	3D printing can increase experimental methods, flexibility, economy, and open science, but it also has drawbacks. Lit review.	In-depth analysis	We demonstrate 3D printing's versatility and inspire future discoveries by reviewing works from Ecology and Evolution.
Niki Vermeulen, Gill Haddow, Tirion Seymour, Alan Faulkner-Jones,	This article reviews social science and ethical literature on 3D bioprinting.	Systematic Review	We identify certain practical, ethical, and regulatory difficulties despite a lack of

Wenmiao Shu, 2015, United Kingdom	3D bioprinting can create human organs on demand, eliminating the requirement for human or animal donation.		socioethical involvement with the technology's effects. These involve regulating public expectations and relying on technoscientific answers to high-income country ailments. We briefly explain "Responsible Research Innovation" as an oversight paradigm if 3D bioprinting promises are realized. 3D bioprinting could be a promising therapeutic in the future, but it needs ethical control and debate now. This article starts that discussion.
Erica L. Neely, USA, 2016	I argue, using current US legislation, that customers cannot properly analyze all relevant risks and hence deserve protection; any regulation will likely apply to plans, not real objects. Second, IP issues	Situational Analysis	With a 3D scanner, numerous products can be scanned and copied without intellectual property protection. These laws are sufficient ethically. Patents should only protect innovation. Creativity underpins intellectual property, yet new technologies transform what is creative..

The paper advised to look at the ethics of 3D printing rules and how they affect policy development to protect all stakeholders in this new technology industry. However, the reviewed studies show that 3D printing researchers wish to address all difficulties and enhance tactics to ensure quality outputs utilizing this novel prototyping and rapid manufacturing modality.

II. Analysis on the existing laws regarding intellectual property rights in the Philippines as described in terms of its implementation and enforcement.

The Department of Science and Technology (DOST) vigorously promoted the establishment of an additive manufacturing industry in the country, but only for medical sciences and without nursing-related variables, opening doors to previously unimaginable advances. Two 3-D printing research facilities opened in Q1 2019. The Bataan Peninsula State University (BPSU) Additive Manufacturing Research Laboratory, a state-of-the-art 3-D printing research facility with the latest additive manufacturing machines, and the Metals Industry Research and Development Center (MIRDC) Additive Manufacturing Center (AMCen), which aims to be the country's leading research center in innovative 3-D printing technologies, were inaugurated. Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) Director Enrico Paringit said the two research centers might help the Philippines outperform ASEAN neighbors Singapore, Thailand, Indonesia, and Malaysia in additive manufacturing.

3D printing enterprises, buyers, and IP owners confront legal challenges. Technology raises IP, product responsibility, regulatory, and other legal challenges. Addressing how 3D printing affects intellectual property and patent infringement. The Philippines' Intellectual Property Code (RA 8293) only covers generic 3D printing patent infringement, according to a 2014 APAA Special Report. The Asian Patent Attorneys Association (APAA) Group of the Philippines presented a 2014 Special Topic Report at the Emerging IP Rights Committee Meeting in Penang Malaysia on 3D printing technology:

Issues	Challenges
1) Patentability of 3D data	Philippine patent law does not consider 3D scanner or CAD software data an invention. Any original, inventive, and industrially relevant technology solution to a human problem is patentable under Philippine law. 3D data are not patentable.
2) Exclusivity of patent rights	The one who produces 3D data does not possess an exclusive patent right based on # 1 (patentability).
3) Ownership of copyright	3D data producers have no copyrights. Section 172 of the Philippine IP Code grants original literary and creative works. 3D data is not literary or aesthetic originality.
4) Data in three dimensions that are produced by items	It does not matter. The 3d data will still not be considered as either as an invention or a copyrightable subject

that are a part of the entity that produces data in three dimensions	
5) Patent infringement involving the transfer of three-dimensional data of an object that has been granted protection	3D data is not patentable. Since 3D data are patentable inventions, unlawful sharing of patented object 3D data may constitute infringement.
6) Violating patent rights by manufacturing things with the aid of 3D data	It is not considered as infringement of patent rights since 3D data are not considered as patentable inventions.
7) Infringement due to repair or replacement of parts of a patented object for business	Patent owners have the exclusive right to restrain, prohibit, and prevent unauthorized parties from creating, using, offering for sale, selling, or importing a product under Section 71.1(a) of the Philippine IP Code. Thus, fixing or replacing a patented product to sell it with new parts is patent infringement.
8) Infringement of Trademark rights or Design rights for generating 3D data of somebody else's trademark or design	When used in commerce to sell, distribute, or advertise goods or services, it is considered an infringement of a registered trademark or design. Subsection 71.1 of the Philippine IP Code applies to industrial designs.
9) Infringement on the Trademark or Design of a Third Party Caused by the Transfer of Three-Dimensional Data	Transferring 3D trademark or design data is also an infringement.
10) Awareness of public on 3D printing technology	The public is aware of the 3D printing technology
11) Knowledge of IP practitioners and educators on 3D printing technology	Practitioners of intellectual property law have a passing familiarity with 3D printing technology.
12) Any strategy or policy about laws to recognize, protect, or control 3D printing that may have been developed by the government or any	None, so far as of APAA 2014 report.

professional organizations.	
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Students of Legal Management at De La Salle University who go by the names Reyes and Ngo (2017) investigated how the advent of 3D printing could impact intellectual property, namely patent infringement. In addition to this, a comparative study of the laws governing the infringement of 3D printing patents in Asia's three major IP hubs—the Philippines, Hong Kong, and Singapore—was carried out. The data analyzes the intellectual property policies and frameworks for 3D printing in the Philippines in comparison to those of other Asian IP centers.

III. Imperatives of 3D Printing to Nursing Science

3D printing can illegally copy almost anything, and this is common to medical and nursing sciences. Thus, unpermitted 3D printing raised object protection difficulties affecting ethical practice in healthcare industry and more so to nursing. Nurses are responsible to the execution of effective delivery of the nursing duties and caring encounter. Copyright safeguards creativity and reproduction to nursing workloads are beneficial and vital but warrant ethical undertaking and responsiveness. The creator can seek copyright remedies if a 3D-printed object is unauthorized and strongly abusing the patient's rights and advocates. Industrial design rights protect an object's ornamental and aesthetic appearance—shape and form—while patents protect its technical function and three-dimensional trademarks allow creators identify their products from competitors'. Patents cover 3D printing. Design protects a product's appearance, and copyrights protect the CAD file's code, design, and actual thing.

Words, phrases, symbols, even 3D-printed shapes can be trademarks. Finally, patents safeguard new inventions, including items. If the printed product is patented, French Intellectual Property Code Article L 613-4 prohibits providing or promising to provide the means to use an innovation without a permission. Since 3D print files are a "essential element of the invention covered by the patent," patent holders can sue third parties for providing or marketing them.

Copyright writers "shall confine limitations or exceptions to exclusive rights to certain special cases which do not conflict with normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the right." Thus, several countries allow "right to private copying" for personal use. Some governments may charge for private copying to compensate copyright holders. Several lawmakers believed charging for 3D printing would limit its development and use. Li, et al. (2014) examined the design and manufacture of 3D chocolate products and the copyright implications of reproducing two-dimensional works in three dimensions, the need for originality, the problems of substantial taking from existing works, consumer/user co-creation of chocolate designs, and liability for authorizing copyright infringement.

On the other hand, to nursing science, it was emphasized by Ye et.al (2020) that in teaching human anatomy 3D printing students were more accurate and faster than conventional pupils. Students in the 3D group performed equally well on the anatomical knowledge test. The 3D group outperformed the cadaver and 2D groups on post-training tests. 3D printing students

were happier with their learning than conventional pupils. RCT quality may affect findings. The 3D printing paradigm in human anatomy teaching is likely to increase ethically.

Lastly, in teaching pediatrics revealed by Asif et.al (2021) it resulted to 5/15 randomized controlled trials and 10/15 cardiovascular studies met the review methodology from 587 results. 3DP models enhanced test scores and procedure completion and anatomical landmark identification compared to 2D diagrams, lectures, movies, and supervised clinical events. Users reported increased self-confidence in grasping ideas and wanted 3DP introduced into regular instruction. Four research revealed model complexity and printer-dependent production costs and times. 3DP models used real-world diseases and were cheaper than "off-the-shelf" models. These primarily non-randomized and single-centered studies did not address bias or reflect long-term or clinically translatable outcomes.

Recommendations

3D printing makes product plans easy to steal online. Infringement issues occur. 3D printing "democratizes" manufacturing, preventing infringement. Rights holders rarely detect others copying their products, making enforcement worthless. Indiscriminate 3D printing affects IP rights holders and requires government enforcement. IP enforcement is tough because each 3D-printed copy costs the patent holder a sale. 3D printers allow anyone to copy designs and manufacture them. 3D printing technologies necessitate updating the Philippines' Intellectual Property Law to handle legal issues like infringement. Thus, requiring to be more inclusive in the nursing education and more so on nursing practice. This will entail a new platform of nursing encounter as it emphasizes the value of it in nursing industry. Thus, Dela Rosa and Castro (2021) encouraged the integration of gender mainstreaming in all aspects of nursing roles and engagement. Thus, may also be seen on the practice of 3D printing technologies to ensure the gender responsiveness of the nursing encounter.

IP Law protects 3D data and non-commercial 3D printing, but numerous questions remain especially in oncologic nursing. Rosa (2018) emphasized that the use of 3D printing technologies to patients who had undergone surgical procedure is beneficial to post-surgical condition especially if requiring prostheses. Who owns a concept, digital model, and product? Can copyright law consider the designer and digital modeler co-creators? If patented, are they co-inventors? Since 3D printer owners invest in object development, why not provide them the same associated rights protection as music producers? Thus, Soriano and Dela Rosa (2021) claimed the need for nurses to have a caring attribute in whatever scheme of their nursing practice. The future nurses must be prepared to this new engagement of use of 3D printing technologies as applied in the practice and most specially to special nursing areas of assignment. In summary, it vitalizes the use of internet in demonstrating the 3D printing technologies as applied to nursing. It may create further simulations and other requirement of clinical competencies. This is agreed by Oducado et.al (2021).

Digitizing an object and printing or submitting its base file to an online sharing site for downloading presents infringement concerns. The Philippine government's 3D printing ventures

leave a regulatory gap. Shouldn't we update the Intellectual Property Code and revise RA 9283 to include 3D printing? 3D printing and its business implications must be promoted due to legal difficulties. Singapore, Hong Kong, Malaysia, Thailand, and Indonesia's additive manufacturing can inspire the Philippines' IP Office.

They enable 3D printing industry-specific regulatory frameworks. 3D printing changes our lives in regenerative medicine, prostheses, sophisticated aviation parts, cuisine, and fashion. This may create a platform for nurses to integrate the need of the health care industry and clinical nursing encounter that 3D printing technologies are most useful on then nursing science. Thus, information gathered from various intellectual property issues would be used to study the strengths, weaknesses, opportunities, and threats each initiative may bring and guide legislators to amend the law or create a policy to help the 3D printing industry develop and protect against infringement. Patents, trademarks, copyrights, and other IP rights influence 3D printer users and manufacturers. Society's adoption of 3D printing requires legal reform. Lastly, it may institutionalize a caring institute that would warrant advocacy on nursing encounter toward improved nursing practice. It may be integrated to various nursing related community based caring program that highlights nursing encounter.

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