

The Pedagogy of Blended Learning and Intellectual Capital Disclosure in Higher Education post COVID19

Reem Essam Bedeir

Lecturer at Faculty of Commerce – Cairo University

Academic Coordinator of Georgia State University joint Program

reem.bedeir@foc.cu.eud.eg

Abstract:

Purpose - This frame aims to develop a framework for measuring intellectual capital disclosure in higher education institutions after Covid19. In addition, this paper uses the proposed framework to measure the level of intellectual capital disclosure in a wide range of faculties of higher education institutions.

Design/Methodology/Approach - This paper reviews prior frameworks for measuring intellectual capital disclosure developed in public sectors (universities) to develop the proposed framework, which includes dimensions of online learning to account for the effects of the Covid19 pandemic on learning pedagogy. In addition, content analysis of official websites is used to assess the level of intellectual capital disclosure for higher education institutions (10 faculties of social sciences and 10 faculties of applied sciences).

Findings - The empirical results demonstrate that: i) the prior frameworks which are introduced to measure intellectual capital disclosure

lack to cover the new aspects of online learning in higher education. ii) The disclosure level of human capital and relational capital is comparatively high; this provides insight into the importance of human capabilities, relationships, and cooperation for higher education institutions. iii) The structural capital disclosure level fails, which reflects the limitation of infrastructure and facilities for these institutions.

Research limitations/implications - The research is based solely on public universities' triple role (education, research, and administration) and does not take into account private universities' other roles of generating or maximizing profit. Future research will be useful to conduct comparative studies of intellectual capital disclosure at public versus private universities.

Practical implications - The proposed framework provides an important opportunity to advance the understanding of how learning pedagogy in the aftermath of the COVID-19 pandemic, and how this would be reflected in higher education's intellectual capital disclosure. The proposed framework can strengthen and motivate stakeholders to pay more attention to the importance of intellectual capital disclosure within higher education situations.

Originality/Value - This paper extends the scope of the literature on intellectual capital disclosure in higher education by developing a comprehensive framework for measuring intellectual capital disclosure in higher education following COVID-19. The proposed framework also incorporates the dimension of online learning.

Keywords - blended learning, pedagogy, intellectual capital, disclosure, online platforms, COVID-19.

Paper type – Research paper.

1. Introduction

The past decade witnessed an increase in online/distance learning. This increase is motivated by many drivers such as the widespread and ease of access to Internet applications and platforms all over the world. Also, this increase is motivated by the growing number of populations in general, as well as the number of students in particular (Li and Irby, 2008; Luyt, 2013; Lyons, 2004). Financial constraints for both students and educational institutions increase the widespread of online learning. Since these constraints prevent students from physically attending classes and prevent educational institutions from having campuses worldwide.

Intellectual capital disclosure has become a primary concern of online learning at all educational levels (e.g., primary education, secondary education, and tertiary education). Intellectual capital can be defined as knowledge-based resources for an institution. These resources actively interact with other resources to generate the institution's value to enhance its competitive advantages. Since, the institution's value increases every time knowledge has been transferred (Sveiby, 1997a; Guthrie and Ricceri, 2002). Intellectual capital is classified as an intangible asset by some scholars. However, there is a significant difference between the accounting

definition of intangible assets and intellectual capital. Intangible assets such as patents, trademarks, and brands are a sub-category under intellectual capital. In other words, intellectual capital encompasses intangible assets and other knowledge-based resources such as reputation and employee morale. Under accounting standards and regulations, intangible assets should be reported within financial reports, whereas corporations disclose intellectual capital "voluntarily" in their annual reports. (Petty and Guthrie, 2000)

COVID-19 has had a large-scale impact in developed countries, with significant advances in health-care institutions, not to mention developing countries with limited healthcare resources. Globally, people's daily routines are changing. In addition, the way of life in countries and nations is changing, and it is clear that the consequences of this global pandemic are not limited to the healthcare system, but it affects other vital aspects of life, such as the education system, synthesizing health and education consists of intellectual capital development. This correlation is related to nations' development and growth. (Todaro and Smith, 2011). Interestingly, Gennaioli et al., (2011) indicate that education, more specifically, intellectual capital resources, contribute significantly to the nations' development.

In the post-COVID-19 world, online learning has become a central issue for the pedagogy of learning during quarantine. Higher education institutions and university tutors respond to the large-scale lockdown both partial and complete by shifting from face-to-face learning to online learning. This quick response to the pandemic, as well as the shift in

learning methods, have led to a renewed interest in investigating the impact of online learning on intellectual capital disclosure.

The purpose of this paper is to look into the connection between blended learning and intellectual capital disclosure in higher education institutions. Educational institutions are service organizations whose primary mission is to transfer knowledge through teaching and research. Researchers have investigated the relationship between intellectual capital disclosure and financial and non-financial performance, and their findings have applications in the industrial and commercial sectors. However, little is known about intellectual capital disclosure in the service sector (i.e., universities), and it is not yet clear what factors could affect the disclosure process. Therefore, this study makes several noteworthy contributions to the literature on intellectual capital disclosure. First, it demonstrates the importance of developing a comprehensive framework to measure intellectual capital disclosure as part of the transition towards online learning following COVID-19. Second, rather than annual financial reports or intellectual capital statements, it measures intellectual capital disclosure through a different type of media, such as web pages. Third, most studies on intellectual capital disclosure have only focused on industrial or commercial sectors. Only a few writers, however, have been able to draw on any systematic research into the service sector (i.e., universities). Fourth, few studies address the comprehensive role of universities in teaching research and administration, more specifically to the best of knowledge of the author. No one addresses the triple role of the university in Egypt.

This paper proceeds as follows Section 2 provides a review of blended learning challenges. Section 3 reviews intellectual capital schemes. Section 4 reviews the literature. Section 5 proposes a framework to measure the disclosure level of intellectual capital within universities after COVID-19. Section 6 discusses sample design and data collection. Section 7 reveals the empirical findings and Section 8 discusses the results.

2. Blended Learning Challenges

Education systems all over the world have witnessed significant evolutions. Since the 90s, the US higher education system has had the privilege of applying a blended education system in which students have the advantages of face-to-face learning in addition to online or web-based learning. Graham (2006, p.3) defines blended learning as "the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies".

Since the COVID-19 pandemic and the need for social distances, the majority of educational institutions all over the world at all levels have shifted from face-to-face learning to online/distance learning. In Egypt on March 13 of 2020, the Prime Minister announced the lockdown of all schools and higher education campuses. Most schools and higher education institutions have shifted from face-to-face learning to online learning. Since then, the educational process has been changed in all aspects and many issues and challenges have become the most significant current discussions in the legal and moral philosophy of online learning. Drawing from the author's experience and previous research (Kebritchi et al., 2017); online

learning presents a number of challenges (e.g., challenges regarding online learners, challenges regarding the development of online content, and challenges regarding online lecturer).

2.1. Challenges regarding the learner

The readiness of online learners is a significant major challenge. A small number of learners could rapidly adapt to the online learning environment and platforms. To be a successful online learner, the learner should have the skills and self-confidence to actively participate in online courses. The learner should also be familiar with and motivated to learn more about online learning platforms and advances (Mayes et al., 2011; Luyt, 2013). Moreover, online learner identity is one of the significant challenges for online learning since online learning has the challenge of identifying a learner's identity. Some educational institutions have secured access to their online platforms. Nevertheless, these limitations could still be decrypted by unauthorized users. This contrasts with face-to-face learning where the lecturer can identify the learners' and participants' identities.

2.2. Challenges Regarding Online Content Development

Because the majority of online learning content is predefined, the lecturer's empowerment is limited. In contrast to face-to-face learning where content delivery could be dynamic during the lecture (Evrin et al., 2011). Besides, one of the challenges is transforming face-to-face material into an online medium. This transformation needs up-to-date and continuous training and technical support (Kyei-Blankson and Keengwe,

2011). Also, to develop an online material: content, pedagogy and technology should be properly integrated to fit with online learning (Koehler et al., 2004).

2.3. Challenges Regarding the Lecturer

Teaching could be defined as a process of pedagogical and educational duties for all levels. With online learning, lecturers are performing these pedagogical and educational duties using more communication and technology-based learning media. The role of a lecturer has been changed fundamentally from a performer in a live classroom to a guide who delivers knowledge via an artificial platform. This shift in lecturer's role increases online learning challenges, especially for novice lecturers (Coppola et al., 2003). Some lecturers find difficulty in transforming the material of a face-to-face lecture into an online medium (Fein and Logan, 2003; Barrett, 2010). Furthermore, the most significant challenge for online lecturers is intellectual capital disclosure. Since online learning basically depends on transferring knowledge from a lecturer to another audience, this audience can not be completely controlled. Therefore, intellectual capital should be protected with complete disclosure. Thus, intellectual capital disclosure is increasingly recognized as a serious worldwide online learning concern. Central to the entire discipline of online learning, as a part of blended learning, is the concept of intellectual copyright and intellectual capital disclosure. Following COVID19, the need for such organizations and initiatives to establish global rules for online learning is growing.

Recent development and widespread of online learning in the U.S higher education system have heightened the need for an organizational body to identify the standards and rules of online pedagogy such as "Quality Matters and Online Learning Consortium". The major role of this organization is to provide facilities and to set rules for online learning pedagogy and facilitate sharing of best experiences. Luyt (2013) promotes positive online learning experiences. Kebritchi et al. (2017) discuss the main challenges and obstacles of online learning in higher education (Morris, Xu, & Finnegan, 2005; Tyler-Smith, 2006).

3. Intellectual Capital Schemes

Several schemes have long been established in literature to present a detailed analysis and measurement of intellectual capital disclosure. This section reviews the theoretical evolution of intellectual capital main schemes.

3.1. Brooking's (1996) Scheme

Brooking (1996) classifies corporate properties into tangible assets and intellectual capital. The intellectual capital scheme is comprised of four basic indicators: market assets, human-centred assets, intellectual property assets and infrastructure assets, see table I. Based on market connections and customer relationships, corporates develop their market assets. Corporates use market assets to maintain customer relationships, increase customer loyalty, make significant contracts with favourable terms, and sign sound agreements such as licensing and franchises. Human-centred assets are defined as the employees' abilities and skills, and design rights,

trade and service marks and work-related secrets. Infrastructure assets include experts, system development and maintaining teams. Human-centred assets comprise education level, professional qualifications, experience, professional assessments level, psychometrics, and contribution to other related duties. Intellectual property assets refer to knowhow, patents, copy technologies and software, business information systems, data warehouses, methods, techniques, and all communication channels such as the internet, extranet and internet facilities.

3.2. The Skandia-Value Scheme

Edvinsson and Malone's (1997) developed the Skandia-Value Scheme which includes five basic components of intellectual capital: financial capital, human capital, customer capital, innovation capital and process capital. Corporate obtains its market value from financial capital and intellectual capital. According to Edvinsson and Malone's (1997) definition of intellectual capital, it comprises human capital and structural capital. This separation gives a better understanding of the human role in formulating corporate intellectual capital. In the second level of the intellectual capital scheme, structural capital includes customer capital and organizational capital, see table I (Edvinsson and Malone, 1997, p. 36).

3.3. Roos et al.'s (1997) Scheme

In 1997 and on the same concept of the Skandia Value Scheme, Roos et al. developed their intellectual capital scheme. In which the corporate gains its market value from its financial capital and intellectual capital. Similar to Edvinsson and Malone (1997), intellectual capital comprises

human capital and structural capital. However, Roos et al., (1997) go beyond this point and introduce a new tree that sums up with six indicators of intellectual capital, see table I. Competence, attitude and intellectual agility are subcategories of human capital, while relationships, renewal and development and organization are subcategories of structural capital.

Competence refers to knowledge and skills. Attitude is the willingness to transfer this built-in knowledge and skills into work outcomes to achieve corporate goals. Intellectual agility indicates the flexibility to use employees' skills in new challenges and adapting* to new situations. Moving to structural capital components relationships refers to all linkages and communications with stakeholders (i.g. suppliers, customers, shareholders, tax authorities and potential investors). Renewal and development refer to all intangible aspects that are built within the corporate to increase its market value. Such as introducing a new line of operations and restructuring plans. The organization includes three aspects of infrastructure, processes and culture, such as intellectual properties, activities and norms (Roos et al., 1997).

3.4. Sveiby's (1988-1977) Scheme

The intangible asset scheme was first introduced by Sveiby (1988), who identifies intellectual capital with three indicators: internal structure, external structure and employee competence. In 1997, Sveiby developed an intellectual capital scheme by emphasizing the role of intangible assets. In achieving corporate market value. Therefore, to indicate the market value, intangible assets should be taken into consideration and be added to the book value of tangible assets (Sveiby, 1997b). The main indicators of

intangible assets are external structure indicators, internal structure indicators and individuals' competence indicators, see table I. According to Sveiby's (1997b) scheme, individuals are the most significant indicators in achieving market value using other structural capital and tangible assets. Internal structure indicators include patents, principles, culture, and different types of systems. While external structure indicators include connections and relationships with externalities from stakeholders (e.g., suppliers and customers), in addition to corporate image, brand and reputation. Finally, with the indicator of individuals' competence, it refers to employees' ability to interact with different situations and beat new challenges (Sveiby, 1997b). In the same vein and time as these contributions, Kaplan and Norton (1992, 1996) introduced the Balance Scorecard. Their measurement has four components: financial, customer, business process, and learning and growth. It has been conclusively demonstrated that intellectual capital is a knowledge-based resource that actively interacts with other resources (tangible and intangible) to create value for the institution and enhances its competitive advantages. The main components of the intellectual capital scheme have been addressed in several schemes, and the conclusion provides a brief summary of content analysis useful for measuring intellectual capital in the service sector and universities in this study.

Table I: Summary Intellectual Capital Schemes

Author	Dimensions	Indicators
Brooking's (1996)	Market Assets	Market Connections Customers Relationships
	Human-Centered Assets	Education level, Professional Qualifications, Experience,

		Professional Assessments Level
	Intellectual Property Assets	Knowhow, Patent, Copy and Design Rights, Trade and Service Marks Work-related Secret
	Infrastructure Assets.	Technologies and Software, Business Information Systems Data Warehouses,
Edvinsson and Malone's (1997)	Human Capital	Knowledge, Skill, Innovativeness, Ability of employees Company's Value, Culture and Philosophy
	Structural Capital	Hardware, Software, Databases, Organization Structure, Patents, Trademarks
Roos et al.'s (1997)	Human Capital	Competence, Attitude Intellectual agility
	Structural Capital	Relationships Renewal & development Organization
Sveiby's (1988-1997)	Internal Structure,	Patents Principle, Culture Different types of systems
	External Structure	Connections Relationships with Externalities from Stakeholders
	Employee Competence	Employees` Ability to interact with different situations and beat new challenges
Kaplan and Norton (1992, 1996)	Balance Scorecard	Financial, Customer, Business Process, and Learning and Growth

4. LITERATURE REVIEW

4.1. The Pedagogy of Blended Learning

Blended learning is fast becoming a key instrument in learning approaches after Covid19. The blended learning approach efficiently combines face-to-face and online learning in order to optimise the learning

and educational institution goals (Garrison, 2004). More recently, literature has emerged that offers contradictory findings when comparing face-to-face learning with online learning. On one hand, Helms (2014) finds insignificant differences in performance between students in face-to-face classrooms and students in online learning platforms. Means (2019) findings, on the other hand, show that face-to-face students outperform online students. Allen and Seaman (2014) reveal the grades average of online students is significantly lower than the average of face-to-face students in an equivalent course. Hapuarachchi (2016) reviews blended learning theories, frameworks, and models. The study cites the most widely identified blended learning elements (namely: student, lecturer, content, technology, student support and institution). Much of the current literature on the pedagogy of learning pays particular attention to online learning. Factors found to be influencing online learning have been explored in several empirical studies. Recent evidence suggests that assessment methods, technological advances, security, communication channels and time management are considered as the main factors in achieving online learning quality (Ko and Rossen, 2010; Limperos, et al., 2015). According to surveys such as those conducted by Mayes et al. (2011), online lecturers are the main participants in the online learning process, and they are responsible for determining and providing solutions to the main challenges of online learning. Ko and Possen (2010) investigate the quality of online learning. Limperos et al. (2015) focus on identifying opportunities and challenges for different aspects of online learning, such as university lecturers, communications and technology

infrastructure, student assessment and evaluation, and curriculum development. Morgan et al. (2016) investigates the effectiveness of teaching soft skills online to students with emotional and behavioural disorders.

4.2. *Intellectual Capital Disclosure within Universities*

Several attempts have been made to develop frameworks for measuring disclosure within the public sector. These attempts address two sets of information: financial and non-financial. The two sets of information assist in creating a complete account of any entity's performance. There has been a considerable amount of literature published on measuring disclosure within the public sector, specifically measuring intellectual capital disclosure in public sectors. A considerable number of frameworks and developments have been introduced, resulting in significant changes to the traditional frameworks of measuring intellectual capital disclosure. Many dimensions of traditional frameworks are eliminated, while others are added to meet global events. In this paper, I modify prior frameworks by including new factors to account for the consequences of the COVID-19 pandemic on intellectual capital disclosure in higher education institutions. Few writers, however, have been able to draw on any systematic research into measuring intellectual capital disclosure within the public sector (Carlin and Guthrie, 2001; Walker, 2002). When intellectual capital is disclosed in a comprehensive form, a full picture of any entity can be drawn. Furthermore, the importance of intellectual capital disclosure is increasing in the public sector, specifically in higher education institutions (i.e. universities).

As an acknowledge-based sector, the primary goal of higher education institutions was to produce, publish, and transfer knowledge. This goal could be achieved via human capabilities and tangible resources. The recent challenge for universities goes beyond achieving excellence in teaching and research (Gonzalez-Loureiro and Figueroa Dorrego, 2010). Accordingly, universities are eager to obtain and maintain accreditation in order to maintain quality in teaching and research. Staff capabilities are a key indicator for universities seeking accreditation. For instance, in Spain, the National Agency for Assessment and Accreditation (ANECA) introduces a guide to evaluate the quality of teaching and research in universities. The International Accounting Standard Board (IASB), represented by its committee (IASC), takes the initiative to introduce a list of standards with high quality, widely accepted, and standardised financial data. The committee works on developing standards to report on intangible corporate resources (such as intellectual capital) (Bontis, 2001). Along with the IASC initiatives, researchers on the same path have introduced and developed frameworks for measuring these intangible resources. More specifically, researchers introduce frameworks to measure intellectual capital disclosure within public sectors and non-profit oriented organizations (Xiuyan *et al.*, 2009; Bezhani, 2010).

This section reviews the initiatives aimed at developing intellectual capital frameworks in higher education institutions, primarily universities. A general intellectual capital framework, developed by a European Union (EU)-funded project in 2009, introduces a framework for reporting on intellectual capital within universities. The framework identifies three

aspects of intellectual capital disclosure: the institution's vision, a summary of intangible resources and activities, and an indicator system (Sanchez et al., 2009). In 2010, another EU-funded project developed a framework for measuring intellectual capital. This framework is designed to increase efficiency in the public sector, specifically in the administrative and technological sectors. The framework includes three dimensions of intellectual capital disclosure: public human capital, public structural capital, and public relational capital (Ramirez, 2010).

Another preliminary work on intellectual capital disclosure is a project undertaken by the European Union in 2006. The application for the project is at the Autonomous University of Madrid (AUM) (Sanchez et al., 2009). Human capital, structural capital, and relational capital are the three basic dimensions of the intellectual capital framework. This framework combines analytical and comprehensive aspects to form what's called a Strategic Matrix. The strategic matrix highlights the governance of the research activities which has five thematic dimensions and five questions (Schoen and Theves, 2006). Funding, human resources, academic outcomes, third mission, and governance are among the thematic dimensions, while the five questions concern autonomy, strategic capabilities, attractiveness, differentiation profile, and territorial embedding. This framework, however, cannot provide a comprehensive review of intellectual capital disclosure. The logical follow of process in accordance with theories in that framework is limited. Management and new public management theories state that it is advisable to clearly separate between input, process and output. The framework does not make this distinction between inputs and

outputs clear. In addition, this framework does not encompass all of the activities and aspects of higher education institutions. There is no comprehensive coverage for both education and research. Moreover, this framework does not link evaluation to the mission and vision of higher education institutions (Sanchez and Elena, 2006).

In 2003; the Danish Agency for Trade and Industry (DATI) has introduced an intellectual capital framework. This framework was originally designed to measure intellectual capital in corporations; however, Fazlagic (2005) used it as a guide to developing his framework for measuring intellectual capital disclosure in universities. Employees, customers, processes, and technologies are the five dimensions of intellectual capital in the Danish Agency's model. The model is divided into three parts to illustrate how inputs are processed and then transformed into output. These three parts are effects that illustrate what happens, activities that illustrate what is done, and resources that illustrate what is created. Fazlagic (2005) applies his framework for measuring intellectual capital disclosure at the Poznan University of Economics and classifies it into two components: human capital and structural capital. The model covers three phases of converting inputs into outputs by answering three questions: what is there (inputs), what has been invested (processing), and which objective has been achieved (outputs), as shown in Figure I. Through splitting between inputs, processes, and outputs, the Fazlagic model overcomes the limitation of the prior model of the Autonomous University of Madrid. However, the Fazlagic model limits the scope of intellectual capital to two categories: human capital and structural capital. As a result,

the Fazlagic model falls short of providing a comprehensive framework of intellectual capital that incorporates the three dimensions of human capital, structural capital, and relational capital.

Figure I: Poznan University of Economics` Intellectual Capital Framework

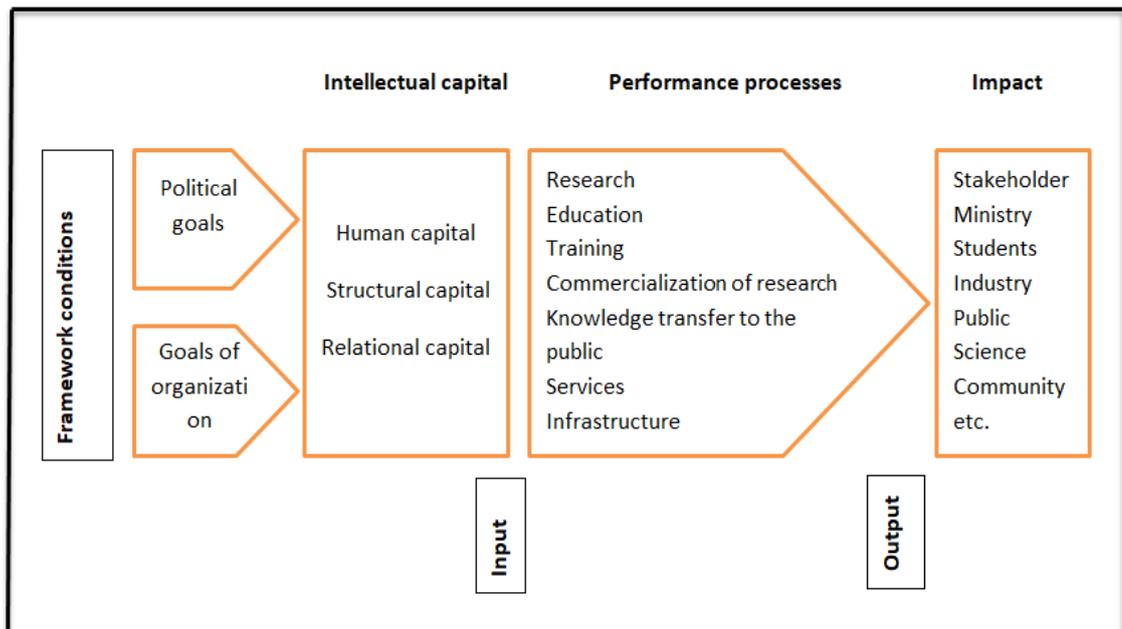
Types/ Categories	What is there? (Resources)	What has been invested? (Activities)	Which objectives have been achieved? (Results)
Human Capital	<ul style="list-style-type: none"> • Number of reseachers • Share of reseachers in total employment • Average age of reseachers • Women in science (share of women in workforce) • Inbreeding (share of reseachers who are graduate of the university) 	<ul style="list-style-type: none"> • Research spending per employee • ITC apending per employee • Time spent in internal seminars per employee 	<ul style="list-style-type: none"> • Number of newly recruited staff • Number of contracts turned down with regret • Staff satisfaction • Staff turnover • Added value per employee • Composite employee satisfaction index • Average number of publications per reseacher
Structural Capital	<ul style="list-style-type: none"> • Share of women occupying managerial positions. • Number of chairs (departments) • Average employment in a cahir (department) • No. of PC per employee 	<ul style="list-style-type: none"> • Total investment in research infrastructure • Research spending per chair (departement) • Participation in international conferences • (no. of conferences attended, no. of reseachers attending conferences) • No. of reseacher projects underway 	<ul style="list-style-type: none"> • No. of international students • Share of international staff • Name recognition and reputation (based on press ranking lists) • Number of students • Number of courses • Averaage number of publications

		(including EU projects).	per chair (department)
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Source: Fazlagic, 2005: P. 5

Leitner (2004) introduces a framework to measure intellectual capital disclosure in Austrian universities, which is widely regarded as the most widely used framework of intellectual capital disclosure in universities. The framework consists of the three exceedingly accepted dimensions of intellectual capital (human capital, structural capital, and relational capital) and has mission and goals under framework conditions, as shown in Figure II. In addition, Leitner employs the new public management theories of separation of inputs, processing, and outputs, and through linking performance to the achievement of strategic goals. However, Leitner’s model does not provide details of how the university mission is linked to the intellectual capital dimensions. In addition, the model does not provide a clear definition of framework conditions (goals and mission).

Figure II: The Austrian universities` intellectual capital framework



Source: Leitner *et al.* (2001)

Gonzalez-Loureiro and Teixeira (2011) introduce a performance-oriented approach to measure intellectual capital disclosure. Gonzalez-Loureiro and Teixeira base their model of intellectual capital disclosure within universities on Leitner's (2002) model. They provide a comprehensive framework of intellectual capital dimensions including human capital, structural capital, and relational capital. Moreover, this model distinguishes between the inputs, processes, and outputs of each category of intellectual capital. The novelty of their model is the approach that is used to reflect how intellectual capital dimensions contribute to overall university performance. In addition, Gonzalez-Loureiro and Teixeira (2011) expand universities' roles to include teaching, research, and transfer. Overall, there also seems to be some evidence that measuring intellectual capital disclosure in universities has three dimensions: human capital, structural capital, and relational capital, as well as the triple role of teaching, research, and transfer. Overall, Gonzalez-Loureiro and Teixeira (2011) seem to have been able to draw on systematic research into measuring intellectual capital disclosure within universities. However, their framework falls short of covering the new pedagogy of online learning following COVID-19.

5. Proposed Framework of Intellectual Capital Disclosure

The past decade has seen rapid developments of intellectual capital disclosure in public sectors. These developments have had a significant impact on the traditional frameworks for measuring intellectual capital disclosure. Many dimensions of traditional frameworks are eliminated,

while others are added to meet global events. Measuring intellectual capital disclosure in universities focuses on value generation and knowledge transfer. Prior frameworks for measuring intellectual capital disclosure in universities are quite comprehensive. Along with these prior frameworks, however, there is increasing concern about the shift to online learning. More specifically, the inclusion of online learning on intellectual capital disclosure is still unclear. More information on the university's online learning mechanisms would help in establishing a greater degree of accuracy in measuring intellectual capital disclosure in universities.

This study proposes a framework for measuring intellectual capital disclosure within higher education institutions. This framework is based on frameworks developed to measure intellectual capital disclosure in the public sector and universities. More specifically, I employ two frameworks: the intellectual capital framework for Austrian universities developed by Leitner et al., (2001) and the performance-oriented approach developed by Gonzalez-Loureiro and Teixeira (2011). This paper, however, contributes to the intellectual capital literature by adding new factors to prior frameworks to into consideration the shift to online learning following the COVID-19 pandemic. Drawing on the framework of the Austrian universities, which have been identified as major contributing frameworks for intellectual capital disclosure in universities, the focus is on the performance process within the three dimensions of intellectual capital (i.e., human capital, structural capital and relational capital). In addition, Gonzalez-Loureiro and Teixeira (2011) expanded the role of the university into a triple role of teaching, conducting research, and transferring.

In this paper, I develop a three-dimensional and three-role matrix for measuring intellectual capital disclosure in universities, to reflect the shift to online learning in higher education institutions following COVID-19. The matrix includes the three dimensions of the intellectual capital of human capital, structural capital and relational capital. In addition, to reflect the triple role of these institutions, this matrix subcategorizes the main mission of higher education institutions into three aspects: education, research, and administration. The proposed framework provides a thorough overview of how to measure intellectual capital disclosure. The human capital dimension of intellectual capital is the first dimension in the matrix. I thoroughly covered human capabilities in the roles of education, research, and administration to measure human capital in higher education institutions. To measure human capital in terms of education roles, the institution should disclose the number of teaching assistants, lecturers below the bar, lecturers above the bar, and professors for each department. Moreover, in order to measure human capital in terms of research role, the institution should disclose the number of each degree holder (master's degree holders, PhD degree holders) as well as the number of postdoctoral researchers for each department. Finally, the matrix includes the role of administration work in order to achieve a comprehensive framework of human capital. The institution should disclose information on the number of people who conduct administrative work (at administration, technical support, and security offices).

Moving to structural capital represents the supportive infrastructure and processes. In terms of the institution's educational role, it should disclose

information about the teaching infrastructure and facilities. The number of teaching rooms, study areas, teaching laboratories, and library facilities. To disclose structural capital in terms of research role, the institution should disclose information about infrastructure and research facilities available. The number of rooms for researchers, research areas, and research laboratories. Finally, to disclose structural capital in terms of administrative work, the institution should disclose information about the infrastructure and administrative work facilities. The number of meeting and seminar rooms, as well as technical and security offices.

The matrix concludes with the intellectual capital dimension of relational capital. To measure relational capital in higher education, the institution should disclose information about relationships (market and power relationships) and cooperation in terms of education, research, and administration roles. In terms of education, the institution should disclose the number of orientation days, students' enrollment on the online platform, weekly face-to-face lectures, weekly online lectures, and the different types of accreditations that the institution has. In terms of research role, the institution should disclose data on total enrollment on the online platform (for master's and PhD students), annual conferences and monthly seminars, database access, weekly lectures or meetings, and so on (face-to-face and online). Finally, to report on relational capital in terms of administrative work, the institution should disclose the number of contracts with externalities (firms, industry, market, hospitals, research centers, third parties, etc.). The total number of frequencies for the human capital and structural capital disclosure indexes is ten for each, and eleven for the

relational capital index. The total frequency of the intellectual capital disclosure index is 31. (See table II).

The proposed matrix serves as the basis for measuring intellectual capital disclosure in universities. In addition to tangible capital, intellectual capital is fast becoming a key instrument in achieving value for higher education institutions. The framework assists in the clear and extensive identification of human capital, structural capital, and relational capital points at the university for each role of teaching, research, and administration. The current environment and the increasing shift to online learning is another important practical implication for this proposed framework. Hence, the proposed framework includes new elements of online learning. Universities achieve their goals through the triple role of teaching, research, and administration, and intellectual capital dimensions are the means by which they do so.

Table II: Proposed Measurement Framework of Intellectual Capital Disclosure in Higher Education Institutions

Missions	Intellectual Capital Dimensions		
	<i>Human Capital</i>	<i>Structural Capital</i>	<i>Relational Capital</i>
<i>Education</i>	-Disclosure about no. of TAs -Disclosure about no. of lecturers below the bar -Disclosure about no. of lecturers above the bar -Disclosure about no. of professors	-Disclosure about no. of teaching rooms -Disclosure about no. of studying areas -Disclosure about no. of teaching laboratories - Disclosure about Library facilities	-Disclosure about orientation days -Disclosure about no. of students' enrolment on the online platforms. -Disclosure about no. of weekly face-to-face lectures -Disclosure about no. of weekly online lectures - Disclosure about types of accreditation
Sub-total	4	4	5

Research	-Disclosure about no. of MSc students -Disclosure about no. of PhD students -Disclosure about no. of post-doctoral researchers	-Disclosure about no. of researchers` rooms -Disclosure about no. of researchers` areas -Disclosure about no. of research laboratories	-Disclosure about no. of MSc and PhD students' enrolment on online platform. -Disclosure about no. of annual conferences and monthly seminars -Disclosure about no. of times that database has been accessed -Disclosure about no. of weekly face-to-face lectures or meetings -Disclosure about no. of weekly online lectures or meetings
Sub-total	3	3	5
Administration	-Disclosure about no. of people in administration offices - Disclosure about no. of people in technical support offices - Disclosure about no. of people in security offices	-Disclosure about no. of meetings and seminars rooms -Disclosure about no. of technical support offices - Disclosure about no. of security offices	-Disclosure about contracts with externalities (firms, industry, market, hospitals, research centers, third parties....etc.)
Sub-total	3	3	1
Total	10	10	11

This proposed framework provides an important opportunity to advance the understanding of intellectual capital disclosure in higher education:

- i. The model can help to highlight the specific dimension of intellectual capital which contributes significantly to achieving the overall goal of the university.
- ii. Similarly, the model can help to highlight the specific role of a university which contributes significantly to achieving the overall goal of the university.

- iii. The model provides important insights into the specific dimensions of intellectual capital that need improvements.
- iv. Furthermore, the model provides important insights into the specific role of the university which need improvements.
- v. Finally, the model provides the stakeholder with insights into how the university influences and contributes to society and the external environment through teaching, research, and administration.

6. Sample Design and Data Collection

Intellectual capital disclosure has become a central issue for higher education in the post-COVID-19 world. To the best of the author's knowledge, this is the first study in Egypt to measure intellectual capital disclosure in higher education after COVID-19.

6.1 Sample Selection

This study's application is on Cairo University and its faculties. The initial sample size was (29), divided between several faculties, institutions, and research centers. Nine institutions and research centers are excluded from the study on the basis of relevance and availability of data. The final sample consists of (20) faculties. As shown in Table III.

Table III: Study Sample

Item	Total number
Total numbers of Cairo University`s faculties, institutions and research centers	29
Excluded institutions and research centers	9
Final sample faculties	20

6.2 Data Collection and Analysis

From an accounting-based perspective; Striukova et al. (2008, p.5) define intellectual capital as “the difference between the value of its tangible net assets and its market capitalization”. Despite its popularity, this definition is inapplicable to this study, which investigates the intellectual capital disclosure in the service sector (i.e., universities). This definition's applicability to the service sector is problematic. Content analysis is an effective way for understanding and identifying the main indicators of intellectual capital disclosure in universities.

Cairo University's website is the primary source of data. Drawing on an extensive range of literature, I use the official website to measure the disclosure level of intellectual capital for Cairo University`s faculties following COVID-19. In contrast to the financial statement, official websites provide additional information on non-financial aspects (Cameron and Guthrie, 1993). Website content analysis is used to measure the level of intellectual capital disclosure. Simply put, content analysis is a technique used to quantify qualitative data (Abbott and Monsen, 1997). Data collection and entry are carried out in the following manner: using a matrix of disclosure index of intellectual capital disclosure, which included three dimensions of intellectual capital disclosure (i.e. human capital, structural capital, and relational capital) and three aspects of the university's triple role of education, research, and administration. Then, for each faculty, a total number of frequencies is assigned to reflect the level of intellectual capital disclosure.

This paper classifies intellectual capital disclosure into three categories: human capital, structural capital, and relational capital. These three dimensions are considered attributes of intellectual capital. Furthermore, this paper subcategorizes the higher education process into three different missions or roles as follows: education, research, and administration. These three dimensions and three subcategories add up to form a matrix that can be used to measure intellectual capital disclosure in higher education institutions. The proposed framework reveals the detailed disclosure level of intellectual capital dimensions through the university's triple role, as shown in Table IV.

7. Findings

From vertical analysis, the findings show that the disclosure level about human capital and structural capital for faculties of applied science is higher than the disclosure level for faculties of social science (59% and 51% respectively) see table IV (HC and SC columns). This resulted in two distinct reasons. (i) The importance of human capabilities for faculties of applied science rather than faculties of social science; and (ii) the intensity of laboratories, supportive infrastructure, and processes for faculties of applied science is higher than for faculties of social science. The findings also show that the disclosure level of relational capital is significantly high for both social science and applied science faculties (more than 50%). This is due to the similarity in increasing disclosure about online engagements following COVID-19. Following COVID-19, there is a significant engagement of faculties Cairo University in online learning via the BlackBoard platform. However, the level of disclosure about relational

capital in faculties of social science is higher than in faculties of applied science (62 % vs. 55.45 %, respectively), as shown in Table IV (RC column). This could be justified because (i) students in faculties of social science engage in more online activities than students in faculties of applied science, and (ii) students in faculties of applied science visit laboratories on a regular basis and need more face-to-face interaction than students in faculties of social sciences.

From horizontal analysis, the findings show that human capital has the highest level of disclosure between the other dimensions of intellectual capital disclosure. This finding highlights the fundamental role of human capabilities in higher education institutions. In contrast to faculties of social science, the highest level of disclosure is relational capital. This finding indicates that relationships and cooperation are important components of intellectual capital and that they play an important role in achieving value for faculties of social science. The lowest levels of disclosure are the dimension of structural capital of faculties of social science and faculties applied science (39%, and 44%, respectively). The reason the disclosure level of structural capital failed is obvious: which indicates the limitations of Cairo University's infrastructure and facilities.

Table IV: Intellectual Capital Disclosure Level at Faculties of Cairo University

Faculty	HC*	SC*	RC*	Average
Social Science Faculties				
Faculty of African studies	60%	50%	54.54%	54.83%
Faculty of Arts	40%	40%	63.63%	47.87%
Faculty of Childhood Education	50%	50%	63.63%	54.54%

Faculty of Commerce	20%	50%	63.63%	44.54%
Faculty of Dar-ALeolm	40%	30%	63.63%	44.54%
Faculty of Economics and Political Science	40%	10%	72.72%	40.90%
Faculty of Graduate studies for statistical Research	60%	90%	63.63%	71.21%
Faculty of Law	50%	10%	54.54%	38.18%
Faculty of Mass-communication	90%	30%	63.63%	61.21%
Faculty of Specific Education	60%	30%	63.63%	51.21%
Average	51%	39%	62.72%	
Applied Scientific Faculties				
Faculty of Agriculture	80%	60%	72.72%	70.9%
Faculty of Archaeology	80%	50%	63.63%	64.54%
Faculty of Computer Science and Artificial Intelligence	60%	10%	72.72%	%
Faculty of Dentistry	40%	30%	36.36%	35.45%
Faculty of Engineering	40%	50%	81.81%	57.27%
Faculty of Medicine	40%	60%	36.36%	45.45%
Faculty of Nursing	40%	40%	45.45%	41.82%
Faculty of Pharmacy	60%	20%	36.36%	38.79%
Faculty of Science	60%	50%	45.45%	51.82%
Faculty of Veterinary Medicine	90%	70%	63.63%	74.54%
Average	59%	44%	55.45%	
*Notes: HC: Human Capital; SC: Structural Capital; RC: Relational Capital.				

8. Discussion

Several studies have explored the factors that have been found to influence online learning. Previous studies have reported on online learning challenges (e.g., challenges for online learners, challenges for online content development, and challenges for online lecturers). In most online learning, the lecturer is in charge of preparing and developing the content of the online course. Furthermore, in online learning, the lecturer actively modifies materials from face-to-face teaching to fit with online platforms. Material designed for face-to-face teaching will not work well with online

learning platforms. Moreover, some lecturers would not simply adapt to online learning advances.

Researchers have not gone into great detail regarding the challenges of online learning. There have been concerns raised about the security of the long-term use of online learning materials. Despite extensive research on online learning, no single study exists which addresses the ethical perspective of online learning in terms of protecting and controlling intellectual capital rights. Therefore, I suggest that this gap be presented in future research.

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