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SOME INSIGHT ON INFRASTRUCTURE AND RESOURCES FOR PRIVATE HIGHER EDUCATION INSTITUTIONS IN THE UK

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Abstract:
No organisation performs best without good infrastructure and resources. The workplace can refer to the physical or the psychosocial work environment from the individual user and organisation's perspective, differing from one industry to another. This study focuses on the physical work environment from an architectural, interior design and performance perspective in a private higher education institution. Two factors characterise office work: the degree of interaction and the level of individual autonomy. Duffy created four types of offices: hive, cell den, and club based on this concept. Examples of such types of offices are provided within the higher education context. Office workers spend plenty of time inside buildings, where their physical environments directly impact their well-being and work performance and productivity. Buildings, classrooms, computer laboratories, and education infrastructure are crucial learning environments in higher education. There is strong evidence that high-quality infrastructure and resources (facilitates) improves student outcomes and reduce dropout rates, among other benefits. A high-quality teaching and learning environment and students' experience are dependent on classroom resources, libraries, computer labs, and equipment. Maintaining, adapting innovation, repairing existing infrastructure and facilities and investing in new structures and equipment all come with significant expenditures. The question of how to fund such development is becoming increasingly difficult.

Keywords: infrastructure, resources, facilities, private higher education UK

1. Introduction

The workplace can refer to the physical or the psychosocial work environment. For example, office employees spend a lot of their time inside a building, where the physical environments influence their well-being and directly influence their work performance and productivity. Individual user and organisation's perspective, differing from one

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industry to another. This study focuses on the physical work environment from an architectural, interior design and performance perspective. Interior design directly connects humans and space.

The fit between different personal characteristics and the physical environment has inquisitiveness in organisational psychology. The fundamental assumption of person-environment fit is that when attributes of employees and the work environment are fit together, they can expect positive outcomes such as satisfaction, commitment, performance, adjustment, reduced stress and low staff turnover.

Infrastructure and resources are crucial in effective teaching and learning and creating a congenial learning environment for quality education. In addition, infrastructure and resources are essential in providing suitable settings for students to learn and for staff to deliver learning and teaching effectively. The lack of suitable infrastructure and resources may negatively impact upon the learning and teaching processes within the classroom (Khumalo and Mji, 2014, p.264).

Is it important first to develop an understanding of infrastructure and resources?

Infrastructure, in layman's terms, is a way of defining basic physical and organisational structures and facilities, e.g. buildings, utility supplies, equipment and so on.

The Cambridge dictionary defines infrastructure as "*the basic systems and services, such as transport and power supplies, that a country or organisation uses in order to work effectively*". From this definition, it can be said that infrastructure is the common concept for the provision of the fundamental physical structure of a business, region or country. Concerning a country's infrastructure, this consists of facilities that are available for public use. Examples of this include transportation systems: land (rail, road, bus and train stations), air (airports), water (ports) and in addition to this communication networks and the supply of utilities (water, gas, electricity).

Infrastructure tends to be capital-intensive and requires high-cost investment, and ultimately it is vital to a country's economic development and prosperity. Recently, Qatar and the United Arab Emirates have invested hugely in developing state-of-the-art infrastructure in their countries. Due to their first-class infrastructure and facilities, these two small countries attract a large number of tourists and investors from all over the world, especially from developed countries. Having an effective infrastructure and the provision of essential facilities help to ensure comfort and satisfaction for residents and visitors alike. To sum up the above discussion, it can be contended that infrastructure consists of "*the physical networks through which goods, ideas, waste, power, people, and finance are trafficked*" (Larkin, 2013, p.327), and having a good infrastructure provides a better quality of life for all.

Infrastructure includes ancillary and complementary resources, facilities, equipment, systems and processes necessary for every organisation's functioning, whether the organisation is public or private. Resources include people, materials, machines, money and other assets that can be drawn on by a person, organisation or nation in order to function effectively. Infrastructure and resources work hand-in-hand.

Román (2008) reveals that school infrastructure and resources are indirect factors that influence and impact upon learning, in terms of aspects such as the class environment, methodology, and time management. The author discovered that high achievement is correlated with the use of resources: "*the teachers that get their students to learn more and better are those who support their teaching processes with use of didactic resources both traditional and high tech*" (Román, 2008, p.214).

2. Infrastructure Building

The physical infrastructure in higher education involves providing buildings comprising reception areas, classrooms, computer labs, libraries, common areas, offices, meeting rooms, staff rooms, function halls, canteens and toilets, etc. In addition to that, the provision of a stimulating learning environment and safety is also a significant consideration in building physical infrastructure.

Public higher education institutions (universities) have invested a huge amount in their infrastructure. Examples of this include the University of Bristol which invested £56.5 million in a Life Sciences building which "*features a five-storey laboratory wing, a state-of-the-art greenhouse and one of the largest teaching labs in the UK*", whilst the University of Bedfordshire has invested £40m in a new building for the teaching of science, technology, engineering and mathematics (STEM) subjects.

Private higher education institutions are particularly aware of the value of having a modern campus. Different cost disadvantages accrue in the form of up-front investment in syllabuses, systems, quality control, operations and marketing.

In terms of infrastructure, facilities, and resources, the Oxford Business College (OBC) is one of the UK's best private higher education colleges. In addition, it is one of the few private higher education colleges in the country, which has refurbished its premises, including offices and classrooms, to facilitate working and teaching through modern technology.

The study by Francis Duffy of DEGW (Duffy, 1997) has been extensively influential. Duffy makes a holistic conception in considering workspaces based on what he called two iron laws: the need to remain competitive through simultaneously driving down occupancy costs and using "*the physical environment to attract, retain, stimulate and inform the increasingly valuable people who work for them*" (Duffy in Clements-Croome, 2000, p. 329).

In the New Office design, which is an influential book on office design, Duffy mentioned that key trends in information technology fundamentally altered organisational work patterns and flattened hierarchies, emphasising teamwork and cross-functional interaction in service-led economies.

The author also developed a widely used matrix model named "Design Logic of a New Office" (Duffy, 1997) which can be viewed table below:

Table 1: Design Logic of a New Office

Model	Logic	Interaction	Autonomy	Examples from HEIs
Hive	Individual Processes	Low	Low	Routine process work, e.g. student data entry, students working on assignments on computers in the library
Den	Group Processes	High	Low	Busy teamwork, e.g. Students group presentations and projects, Media, art work, advertising
Cell	Concentrated Study	Low	High	Concentrated professional work, e.g. Accounts department, Students exam preparations in designated areas
Club	Transactional Knowledge	High	High	Knowledge work, e.g. Group discussions, meetings, IT projects

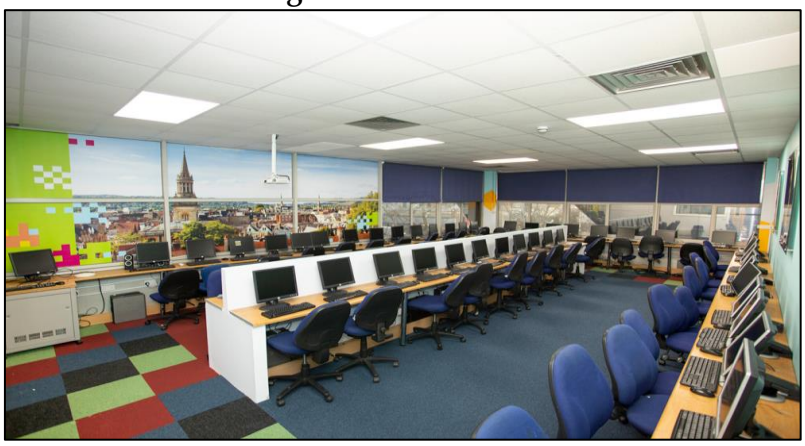
Source: Adopted from (Duffy, 1997).

In this model, interaction stands for the need for face-to-face contact necessary to carry out work tasks in the office. Finally, autonomy defines the extent of control, responsibility, and discretion employees require over the work process's content, method, location, and tools. The blend of autonomy and interaction makes the office's functional features, which, jointly with the spatial layout, define four office types, defined by Duffy (1997): the hive, den, cell and club.

2.1 The Hive (Low Autonomy, Low Interaction)

Individual workers are involved in solo routine activities with low autonomy and interaction with other workers. In hive offices, individuals can often find detached and screened desks organised systematically in an open-plan space. Business process outsourcing (BPO) and call centres are classic examples of hives, where processes often rely on automation and are also often established in countries or regions with cheaper labour costs and raw materials (e.g. Bangladesh, India, China, Philippines, to name a few). Hive offices are declining in the UK; however, there are prominent new examples across the globe including call centres in locations such as India and the Philippines.

Figure 1: Hive Offices



Source: OBC computer lab West London Campus

Oxford Business College (OBC) has established hive spaces (individual student offices/workstations) in an open plan setting for students to work on their assignments and these spaces are often lively and buzzing, with the majority of hive spaces being situated in the computer labs and library.

2.2 The Den (Low Autonomy, High Interaction)

Den offices are most suitable for group work and provide various interactive provisions, whilst each worker still has a designated workstation. The individual workers are involved in tasks with high interaction levels with others; usually, decisions are made as a group as opposed to the presence of autonomous decision-making. Individuals have their own desks in an open-plan setting, sharing common facilities such as photocopying and printing.

OBC has established den offices for marketing and multimedia teams.

Figure 2: Den Offices

Source: OBC Library West London Campus

2.3. The Cell (High Autonomy, Low Interaction)

Cell offices are typically found in professional firms such as in law and accounting. Academic offices may include the office of Head of Programmes or Director of Studies. In contrast to hive and den offices, cell offices are spatially private and suit tasks with low interaction levels but high autonomy. These types of offices are often composed of a series of enclosed rooms. Privacy, in general, is the right of an individual; therefore, institutions to determine for employees the nature of the job and build cell-type offices. Privacy, in general, is the right of an individual; therefore, institutions to determine for employees the nature of the job and build cell-type offices. Office space privacy is considered one of the essential types of overall privacy. However, employees usually deal with office space privacy with unique concerns. They feel discomfort, anger and anxiety when their office space privacy is exposed beyond their desires. For example, the higher education examination department would not allow the irrelevant person to come and see the students' results before they are officially published. Therefore, their offices have a notice on the door such as "No Admittance Without Permission". However, these

offices can also be established in an open plan environment with high screens surrounding each desk depending on the level of privacy is needed.

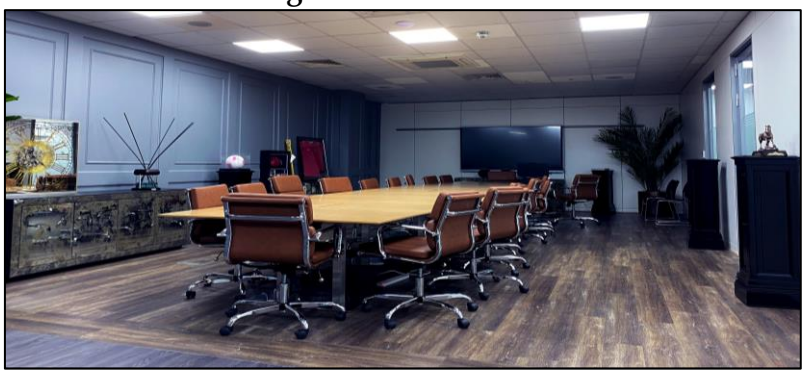
Figure 3: Cell Offices

Source: Module leader office West London Campus

2.4 The Club (High Autonomy, High Interaction)

These types of offices represent the move towards more complex forms of working, involving both high interaction and high autonomy. Club spaces facilitate transactional knowledge and executive meetings involving various employees from middle and top management.

Figure 4: Club Offices



Source: OBC Meeting Room Beaver House Oxford

OBC example of all the four types of offices:

- the "hive": the College's IT laboratory, students desks in the library and student data entry office
- the "den": the marketing and multimedia units dealing with the promotion of the college as a large interactive working area, with screens and individual spaces
- the "cell": individual offices such as the Principal office

- a mix of "cell" and "den": programme offices, with the head of the campus retaining a single-occupancy office, with the agreement that the rest can be used by others when unoccupied; most of the part-time lecturers use this type of facility
- the "club": meeting, board and conference rooms

Out of the above four mentioned offices, each implies a unique approach to the use of space. The hive office is highly structured and aims to concentrate on routine tasks, while cell offices are quiet and comprised of individual units that allow staff to concentrate on their performance. Den offices can provide a lively social atmosphere and high level of face-to-face interaction, however also can provide higher noise levels and distraction. Several studies have concurred in contending that dens or open-plan offices improve the mood and behaviour of employees. But on the other hand, such a layout does affect performance, as some employees are not comfortable in a noisy open environment. For example, Hedge (1982) found that employees working in open-plan offices consistently reported problems associated with a lack of privacy and increased disturbances. Lastly, the club office provides a variety of work settings, for example, a common area, study zone, meeting room, board room, conference hall, café, team area and touchdown station and so on. This facilitates a lively social atmosphere in which problems are discussed and appropriate decisions are made.

Employees in hive, den and cell offices all have their own assigned desks and workstations while employees working in club offices do not have this facility. In club offices, various types of work settings are available, each designed for specific activities, which are utilised on a need-to-use-basis. The occupancy level usually shifts periodically in organisations that adopt this office type. The type of work suitable for the club office demands both much autonomy and interaction. Hence, the club is appropriate for knowledge work, tasks that are non-routine and require a considerable amount of judgement and intellectual processing. Companies that incorporate such offices are usually highly dependent on knowledge sharing combined with highly self-governed and educated staff.

Contemporary modern office designs encourage interaction and collaboration. Twenty-first century modern employers understand that employees can interact and work simultaneously and that such work is beneficial rather than detrimental to long-term productivity. The office layout, space, and design can significantly impact employee communication, collaboration and performance.

Emerging literature suggests that appropriate workplace design is crucial to successful business strategy (Chan et al., 2007) and organisational performance (Van de Voorde et al., 2012). Numerous factors govern a person's efficiency and happiness in the office atmosphere but, psychologists have acknowledged that the physical environment has a significant influence on employee productivity and satisfaction (Gifford, Steg & Reser, 2010). Many researchers have noted that workplace design, along with effective management processes, is playing an essential role in enhancing employees' productivity and boosting organisational performance (Uzee, 1999; Leaman and Bordass, 1993). A study of 200 UK business managers by Schneider the architects Gensler (2005) found that

a better workplace would increase staff productivity by 19% and their own productivity by 17%.

Figure 5: Appropriate Office Design

Source: Chairman office Beaver House Oxford

Psychological behaviour is affected by interior design through various aspects. Every person receives, perceives and responds differently. This is due to physical and psychological differences and the differences in personal experience.

The interior design of a workplace directly influences employees' social interaction. For understanding more precisely, it is divided the social interaction in terms of privacy and personal interaction levels. Since interior design is beautiful is a sociological human need, it would ensure a sociable environment within the premises if done well. Therefore, a good interior design in a workplace ensures more contented and productive employees.

The proper infrastructure of school buildings is needed as it might affect learning. Schneider (2002) concluded that acoustic conditions, lighting and ventilation, among other factors, bear on students' and teachers' ability to perform.

OBC also considered sustainable factors in designing offices for the new campus (West London). OBC designed office spaces in a sustainable and environmentally friendly way, not only from the employer's perspective but also from the employees' perspective as well. A brief list of such environmentally-friendly actions include:

- Replacing all fluorescent lights with energy-efficient lights,
- Installing motion-activated light switches,
- Setting up detailed signage for waste and recycling,
- Providing desk plants,
- Installing large windows and full glass panelling offices to allow natural light to enter the office spaces.

In contemporary literature centred around office environments, some offices are described with different labels, for example, cell offices are referred to as traditional offices, individual offices are referred to as enclosed offices, while club offices are referred

to as activity-related or activity-based offices, flexible offices, multi-space offices or non-territorial offices (Boutellier, Ullman, Schreiber & Naef, 2008; Brennan, Chugh & Kline, 2002; De Croon et al., 2005; Hedge, 1982).

3. OBC Infrastructure and Resources

In today's competitive world, higher education institutions (HEIs) are continuously striving to provide world-class infrastructure, top-class resources and first-class facilities to meet the needs of staff, students and visitors. OBC is pursuing a growth strategy and has opened West London, Coventry, and Nottingham campuses.

The College has recently opened a campus in West London with a view to making the space more productive. In addition to the attractive external face of the campus, the campus was developed to create lively and effective learning and working spaces.

3.1 Resources

Institutional academic resources come in the form of provisions and resources including the library, computer laboratory, Virtual Learning Environment (VLE) and equipment such as printers and photocopiers, all of which are crucial in providing an effective learning environment in HEIs. There is explicit evidence that possessing a high-quality infrastructure facilitates better instruction, improves student outcomes, and decreases drop-out rates, amongst other benefits.

3.1.1 Library

The academic library is regarded as a library attached to an academic institution, serving the teaching, learning and research needs of students and staff. The library serves two complementary purposes; to support the curriculum and to support the research of the university faculty and students (Umoh, 2017)

The library is one of the most essential facilities in a HEI and is frequently used by students and faculty in order to support learning and teaching needs. The library is a repository of knowledge and a dynamic location in which reliable information can be obtained and social interaction is facilitated. The West London campus library contains all core, recommended and reference books required for use in all courses offered by OBC.

The OBC Library aids students to access all essential resources necessary to complete their assignments and for faculty members to complete their research projects. In addition, the library helps to keep students and staff up to date with social, political and economic developments in society and around the world by providing newspapers and world-renowned magazines. The library provides light reading materials that help to broaden students' minds and develop their moral and intellectual horizons.

3.1.2 Virtual Learning Environment (VLE)

A Virtual learning environment (VLE) provides a hub infrastructure for students' digital learning experiences in HEIs. Makewa, Magaleta and Role (2017) define VLE as an information technology-based environment in which learners interact with learning materials (example assignments and exercises), and instructions are mediated through technology. The VLE thus renders a solid base for sharing learning resources, managing assignments and student communications. The VLE enables students to communicate and engage with their lecturers and other students. According to Santos and Esposo-Betan (2017), the VLE has emerged to become one of the most significant technological features of the 21st century concerning its diverse application, usage, and ability to provide an effective teaching paradigm.

3.1.3 IT (Computer) Laboratory

Over the years, computer technology has become a crucial component of education and has had a significant impact on learning and teaching is widely accepted (Mitra et al., 2000). The successful integration of computer technology in educational settings primarily depends on the institution's well-equipped and functional computer lab facilities (Saadon, Rambely & Suradi, 2011).

OBC each campus has an IT lab equipped with state-of-the-art computers that all have a standard set of software installed, as well as access to emails and the VLE. Computer labs are separated into two different types of spaces: main computer labs and WiFi study areas.

3.1.4 Classroom Resources

Digital technologies are considered as one of the most important pedagogical tools that can facilitate teaching and learning in the 21st-century classroom. The modern classroom is equipped with a smartboard, projector and often at least one computer. Active learning using Smart Boards cooperative learning, and flipped classrooms have also become popular (Lasry, Dugdale, & Charles, 2014).

Most instructors use instructional information and communication technology (ICT) in their courses (Schmid et al., 2014). The ICT related usage includes PowerPoint, podcasts, videos, polling software, simulations, digital textbooks, course management systems, lecture capture, and web conferencing (Fichten et al., 2018; Tarawneh, Tarawneh, & Alzboun, 2011).

4. Conclusion

Infrastructure and resources are integral in facilitating effective teaching and learning and creating friendly learning spaces, as well as in providing quality education. Higher education access has risen globally, but resources and infrastructure at HEIs have not kept pace (Hubball & Burt, 2004). Still today, many HEIs throughout the world lack

resources and a strong infrastructure that is of paramount importance in supporting teaching and learning.

Mbembe (2016, p.30) echoes Murillo and Román (2011), arguing that:

> *"To some extent, a good university education is impossible without an extensive material infrastructure/architecture. Intellectual life can be dependent on the sort of buildings in which conversations take place"*

There is some truth in this. In the UK, private higher education institutions realised that they were not attracting new students and that their businesses were not growing, causing such HEIs to invest in infrastructure and facilities.

Infrastructure and resources are the backbones of education, partly because the teaching and learning process does not take place in a vacuum but is highly influenced by the environments in which it takes place.

The classroom resources, library, computer laboratory and equipment are central to a high-quality teaching and learning environment and a student's experience. There are, however, significant costs associated with maintaining, adapting and refurbishing the existing infrastructure and facilities and investing in new buildings and equipment. There are increasing challenges of how to fund such development.

Conflict of Interest Statement

The author declares no conflicts of interests.

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