

A REVIEW OF HIGHER EDUCATION CHALLENGES AND DATA INFRASTRUCTURE RESPONSES

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Abstract

Higher education institutions are large, complex, adaptive social systems like all other human organizations. Over the last decade, Higher Education around the world is facing a number of challenges and potential threats to effective learning and teaching support. In recent years considerable interest has focused on identifying those challenges, identifying opportunities and threats and proposing ways to address them. However, the relevant literature on higher education challenges is scattered over many textbooks, conferences and journals. This paper provides a comprehensive presentation of all those challenges found in the literature in a structured way. Also this study will identify how technology and data infrastructures could provide responses to address those challenges in a world where students are changing, their learning styles are changing, and the technologies to accommodate their needs are changing.

Keywords: Higher Education Challenges, technology, Higher Education Infrastructure, Data Infrastructure.

1 INTRODUCTION

Over the past decade, not only has higher education in England doubled in size, but also everywhere in the world the higher education has doubled in size.. There are lots of changes in the Higher Education (HE), students are changing, and their learning styles are changing as well as their demands are changing. At the same time, much more has been expected of institutions in terms of their wider engagement locally, regionally, nationally and globally. Universities need to prepare students for a more global future. Higher Education (HE) institutions around the world face the growing problem of relevance as they enter the twenty-first century [4]. Higher Education facing a number of challenges and most contributions mention curriculum design, student retention, new technologies, quality of learning and teaching, widening participation, quality of research, funding and the necessity to improve governance and management as the most burning challenges. To provide the best service to the new students higher education institutions need to change and hence, they need to response to the challenges This paper is intended to demonstrate all those challenges currently facing HE and also we group those challenges based on their interrelationship and influence of those challenges. Also we discuss about institutional data repositories and how institutional repositories can address these challenges with the help of technology.

In the next section, we discuss the challenges as presented in various sources of literature. Following this presentation, we attempt a grouping of those challenges that illustrates in a more effective way their interrelationships, which we believe is necessary in order to better understand them and address them. Subsequently we discuss how institutional repositories could provide responses to some of those challenges. The last section concludes the paper and indicates future research based on this review.

2 HIGHER EDUCATION CHALLENGES

Higher education is a large and complex system. Over the last decade, Higher Education around the world is facing a number of challenges. In recent years considerable interest has focused on identifying those challenges. We have found 20 challenges mentioned in the literature, which are summarised below:

2.1 Curriculum design/alignment

It has been argued that higher education (HE) Institutions should listen carefully to the changing needs and expectations of the society. The SemTech (Semantic Technologies for learning and teaching) project identified curriculum design / alignment one of the HE challenges from learning and teaching perspective [1]. In [3][4] the authors advice universities should be more responsive when offering new study programme or course. To act globally in a competitive environment, the HE institutions must offer programs to students that will cover their needs and wishes and they can also provide interdisciplinary programs to meet the 21st century's higher education demands [2][6]. HE institutions need to reformat and reorganize courses, programs, and structures to increasingly sophisticated and market-knowledgeable students [5]. As students are paying more so their demands have increased in course and quality [7][8] and higher education should respond their demands. However to make mobility feasible, it is essential to assure mutual recognition of degrees and credit points while at the same time allowing for individuality and diversity. So HE Institutions require to redesign or align their curriculum to support today's' students to fit globally [3][4]. To ensure the quality of learning all institutions need to redesign of the curricula. In [9][10][16] also mentioned curriculum design is one of the burning issues in today's higher education. No students will be leg behind through curriculum alignment; all of them can compete equally in this globalization era.

2.2 Student Employability

Employability remains high on agenda for HE Institutions in all over the world. People are seeking educational opportunities to survive in the world of work [11]. As the financial burdens on students and graduates grow, they increasingly find gaining a degree as a necessary first step to starting their career hence employability is a major and growing concern [2][4][10]. The new agenda for education, to sell education and to provide for market needs [8]. Higher skills significantly influence life chances and earning potential. Employability has been defined [2][4][7][8][9] as a set of skills, knowledge and personal attributes that make an individual more likely to secure and be successful in their chosen occupation. Employability is also defined by the learning outcome of a programme with parallel personal development for example work experience and extra-curricular activities. Higher education should take steps to enhance student employability [6][7]. The choice of degree subjects and its relevance to the employment market is affected to some extent and HE institutions should respond to this by involving employers in course validation to ensure that academic standards meet employer requirements [2][3][5][9]. Employers are responsible for offering work placement and practical experience for students and universities should become more flexible in providing employers needs [9]. According to [16] 21st century's curriculum should consider student employability seriously and include key skills (team working, communication skills, presentation skills, information technology, critical thinking etc) to promote student employability. Therefore, HE Institutions should take necessary steps to address this issue immediately for the greater interest of students as well as for themselves.

2.3 Widening participation

The demands of Higher Education increased for the application of increased knowledge of the labour market. But the problem is access to HE due to social origin, increased student fees, substitutions of loans for grants, diminishing subsidies to student facilities and so on [3][4]. Too many lower income and minority students fail to enrol in higher education [6][9]. According to [6] the federal government's Advisory Committee on Student Financial Assistance indicates that each year nearly 400,000 academically qualified students fail to pursue a postsecondary education because they cannot afford it. In many countries the current pressure is to extend the number of students in the HE. IAccording to [9][16] in UK the target is at least 50% of the young people should enter to the HE. In UK since 1997 the government has increased funding to support the HE sector in widening participation [3]. Widening access and improving participation in higher education are a crucial part of the mission and form one of the strategic aims of the ¹Higher Education Funding Council for England (HEFCE). Also in [5][6][7][10][13] mentioned accessing higher education becomes one of the key challenges needs to address by HE institutions.

¹ <http://www.hefce.ac.uk/>

2.4 Quality of learning and teaching

Maintaining quality has the highest priority to any organization and it is mostly appropriate to the HE institutions. HE Institutions should care about the quality of learning and teaching because it is the only way to become recognized globally. The HE institutions will lose their potential customers if they cannot assure high quality standards [4]. To improve the quality of learning and teaching, HE Institutions can enable access to learning and teaching material across institutions [1]. Therefore, students/learners can get more information about their subject area to learn as well as teachers can have also more information to teach broadly in an area [4][5][9]. HE institutions need to take extra care to maintain the quality of learning and teaching to ensure best possible student experience. Maintaining excellence in both teaching and learning is key to universities mentioned in [9]. In USA Fund for the improvement of Postsecondary Education (FIPSE) is introduced to improve students learning [6]. On the other hand as student fees now a high proportion of funding, universities have had to improve the quality of their teaching and also to attract international students they need to provide higher standard of teaching [8][9]. In UK since 1997 the government has increased funding for improving the quality of learning and teaching in HE [3]. In [7][10][13] the authors also define quality of learning and teaching as one of the crucial issues in HE. ¹HEFCE in UK aims to ensure that all higher education (HE) students benefit from a high-quality learning experience that fully meets their needs and the needs of society.

2.5 Quality of research

To be the best in the world wide in research, HE institutions need to strengthen their research capacity [9]. In order to achieve this challenge HE Institutions need to develop multidisciplinary centres bringing together many areas of expertise and building relationships between teams in universities and industries to well establish their research capacity [7][9]. In UK maintaining the quality in research takes seriously and the government has increased funding for improving the quality of research [3]. Also this will require a greater focus on world-class research and greater recognition of the potential benefits of research concentration in the key area [9]. ¹HEFCE in UK aims is to develop and sustain a dynamic and internationally competitive research sector that makes a major contribution to economic prosperity, national wellbeing and the expansion and dissemination of knowledge. In [4][5][10] the writers also indicated maintaining the quality of research as one of the important tasks of the 21st century's HE institutions.

2.6 Accreditation

One of the principal means of providing accountability for HE Institutions and programmes is accreditation, the most critical part of quality assurance in higher education [6][9]. It affects institutions' ability to attract students (home, international), research funding bodies or to attract interest from the business and private sectors [16]. According to [21] in USA, federal student aid funds are available to students only if the institutions or program they are attending is accredited by a recognized accrediting organization. Hence it becomes more important to the HE institutions. In [1][11] accreditation is also specified as one of the major challenges in HE. All accreditors make students' learning outcomes a central component in the accreditation reviews [5][6][9]. Accreditation defined as a strong, meaningful assurance of academic quality in [6][21]. To efficiently accredit HE Institutions and programmes by professional bodies' institutions can make related information accessible to the accreditation bodies. As institutions information scattered across departments so institutions can integrate those information and then make it accessible for efficient accreditation [1].

2.7 Compete and collaborating globally in research and talent

There is global competition for talent in top students, researchers & lecturers [3]. Institutions need to compete at a world-class level in teaching & research. HE institutions need to maintain higher standard of research so that they can be recognized internationally and can compete with other HE institutions by means of higher quality and higher standard of research [3][4][9]. Maximising the research capacity HE institutions can make top quality relationships with other higher education system elsewhere in the world [7][9][10]. Moreover, HE Institutions are finding that international & local collaboration with other HE Institutions, industry, communities & government is necessary to exploit the opportunities offered by globalization [3].

2.8 Student retention

Today's HE Institutions have wide range of students from different regions and countries. HE Institutions are increasingly recognizing that to gain public support and participation and to make higher standard of the institutions, they need to become more focused on student retention [5]. The SemTech project [1] identified student retention is one of the HE challenges. Student retention becomes a concern for HE institutions in some other literature [7][10] as well. HE Institutions need to focus on student retention with more effective student support. HE Institutions require monitoring students' overall progress [1], and on the basis of their information they can take necessary steps for the students from the very beginning. They also need to take into account from the very beginning why students take off from a programme or from any specific modules. They need to focus on this issue to improve retention. ²JISC is doing to help improve student retention and motivation in the UK Higher Education.

2.9 Adopting emerging technology

Today's world is driven by technology for its communications, its economy and increasingly its day to day organization. The rapid development of information technology has made available a plethora of new tools for higher education [5][14]. . New technology offers learning opportunities anywhere to anyone at anytime anywhere [14]. Further the response of HE Institutions to this new technology is uncharacteristically rapid. The lack of investment in technology based learning in higher education may prove to be a significant barrier to the ability of universities to compete in new or changing markets [5][10]. Technologies like internet and its associated technologies can increase the capacity of an educator more quickly, easily and more scalably to help students make connections to content, context, and community—resulting in more powerful learning experience [11]. The accrediting agency for teacher preparation programs in the United States (NCATE) is directly addressing the need for new teachers to be competent in the use of technology in their own teaching; by beefing up its standards for the year 2000 which will be performance-based and will emphasize technology [11]. The need for the flexibility and contextual learning provided by electronic tools is increasing. HE Institutions should meet the challenge of technologies [4][6][9][12][16]. In UK, ²JISC is working to explore, test and acquire an understanding of a variety of technologies and how they might be used in HE.

2.10 Assessment

Assessment is a key process in Higher Education. It provides how learners are assessed shapes their understanding of the curriculum and determines their ability to progress. At the same time, assessment and feedback form a significant part of practitioners' workloads and, with increased numbers, reduced budgets and higher learner expectations, continue to be a matter of concern for many institutions delivering higher education [1][23]. According to [19] institutions should have effective mechanisms to deal with breaches of assessment regulations, and the resolution of appear against assessment decisions. ²JISC in UK has been working in technology-enhanced assessment for over a decade, promoting work on the technical and interoperability issues associated with on-screen testing, and the broader technical, pedagogical and institutional considerations for the effective use of a wide range of technologies to support assessment and feedback.

2.11 Addressing of plagiarism

Concern has recently increased in Higher Education system that the incidences of plagiarism (the passing of someone else's work as though it was one's work) may be rapidly increasing. Before 1990's example of plagiarism appeared to be comparatively rare but the recent massification of higher education observable as a world-wide phenomenon, has raised concerns in the academic community that plagiarism may now be a serious and endemic problem [17]. Addressing of plagiarism is considered as the vital issues in Higher Education [1]. It is our belief that inaction in tackling the growing worries about and possible instances of plagiarism and collusion will threaten the integrity and reliability of higher education awards in the UK [18]. In the UK, plagiarism is now considered sufficiently serious for academics to consult. ³Joint Information Systems Committee Plagiarism

² <http://www.jisc.ac.uk/>

³ <http://www.jiscpas.ac.uk/>

Advisory Service (JISCPAS) established by JISC, promotes good practice in this area and provides guidance in all aspects of plagiarism prevention.

2.12 New generation of staff

The best-organized institution is worth nothing if it does not have a qualified teaching staff; an unqualified staff means poor teaching and unimaginative research [4][10]. As per [16] to teach the curriculum including employability skills successfully universities need to develop the new capacities among their traditional teaching staff and new approaches to their teaching. HE institutions will need to develop faculty and staff dedicated to engaging a diversity of learners with more complex learning needs. HE Institutions can offer different types of training for their staff so that they can be up to date with current HE environment and can develop themselves where necessary [5][8]. New generation of staff should consider the education is a continuing process. Hence they always need to develop for being up to date with the current changing HE environment. The NCATE in the United States is directly addressing the need for new teachers to be competent in the use of technology in their own teaching; by beefing up its standards for the year 2000 which will be performance-based and will emphasize technology. The U.S. Department of Education is addressing the funding need by providing \$75 million with its new program, "Preparing Tomorrow's Teachers to Use Technology." [11].²JISC also helps in developing staff in UK Higher Education providing resources to universities and their staff.

2.13 Tenure

The rapidly changing world, the speed of knowledge creation, and economic pressures are causing HE institutions to place greater emphasis on flexibility. Hence tenure becomes another crucial and difficult issue in HE institutions [4][11]. HE Institutions must concentrate to effectively manage this issue for their greater interests. For example they can replace resources at the expense of others while there is a need. Another example, some senior faculties who seemed as no longer productive can be replaced hiring new faculties in an emerging area. However, at the same time, measures should be taken to offer alternative solutions for those losing tenure, like offering alternative occupation within or outside the institution or introducing a flexible age-of-retirement scheme. Also limitation to tenure should be handled carefully to prevent discouraging young researchers from investing the necessary time in research to pursue an academic career [4].

2.14 Funding

HE institutions are in serious financial crisis. Moreover, increased student fees, substitutions of loans for grants, diminishing subsidies to student facilities and so on form a financial barrier to perspective students [4][9]. The authors reported in [8] that 20 years ago public funding paid for virtually 100% of costs of the sector but today it is very far from being the case, for example in Australia is now heading 30% of the university funding from the public purse. Too many lower income and minority students fail to enrol in higher education. According to [6] the federal government's Advisory Committee on Student Financial Assistance indicates that each year nearly 400,000 academically qualified students fail to pursue a postsecondary education because they cannot afford it. On the other hand, HE institutions' expenses have increased a lot than before. They have to maintain themselves with the limited budget. Hence, this becomes one of the major challenges in Higher Education now a days. According to [7] the funding bodies provide less than 40 per cent of the income of most institutions.

2.15 Group formation for learning and teaching

In present HE institutions where students come from different communities or different countries to study. Moreover in some cases students are not in the same place to study they stay in different place and learn through online regardless of time and place (virtual university). Hence to have efficient learning and teaching teachers often like to put students into groups to work together for any projects, to participate in different discussion forums, or even to make batches of students in order to study their performance on a certain task [1][6][16]. This group formation can be based on different criteria like students coming from different cultures, different gender, and so on. Hence group formation becomes an important consideration in today's HE environment.

2.16 Critical thinking and argumentation

Critical thinking has been recognised as an important aim of HE institutions in the recent years [1][16]. Critical thinking employs not only logic but broad intellectual criteria such as clarity, credibility, accuracy, precision, relevance, depth, breadth, significance and so on. The process of critical thinking involves the careful acquisition and interpretation of information and use of it to reach a well-justified conclusion. Critical thinking is important, because it enables one to analyze, evaluate, explain, and restructure thinking. The various skills that are collectively termed 'critical thinking' are regarded as an important component of the so-called 'transferable skills' accrued during higher education [15]. To build students perfectly for this competitive and demanding world HE institutions should give more emphasis on supporting their students in critical thinking and argumentation.

2.17 Construction of personal and group knowledge

In this globalization environment where the speed of knowledge creation is very high and demanding, HE institutions also realizing the importance of more personal and group knowledge creation [16]. Institutions can focus on improving the quality of learning and teaching by more efficient personalised knowledge construction allowing access to the knowledge capitals of HE institutions, as well as more efficient contextualised group knowledge construction [1][4][5]. Hence it becomes one of the aims of today's HE institutions.

2.18 Contribution to economy

Institutions are seriously challenged to secure or even increase their revenues [4][10]. Universities are the most important mechanism we have for generating and preserving, disseminating and transforming knowledge into wider social and economic benefits [3][9]. It is vital that universities use their knowledge capital to contribute to economic growth, both through the commercial application of the knowledge they generate and through preparing people for the world of modern work [9]. Building new partnerships with business and industry will provide an important channel for generating the financial resources [3][5][7]. Also according to [9] HE Institutions need to give priority to the programmes that meet the need for high level skills, especially for key sectors including those identified in the new Industries. Also HE Institutions can find out new area of research to attract funding bodies. In this way they can contribute to the economy of a nation.

2.19 Integration of knowledge capital and cross-curricular initiatives

To support better learning and teaching activities integration of HE knowledge capital like research output, learning and teaching materials etc is essential [1]. Also cross-curricular activity in learning and teaching is essential to improve the standard of the HE institutions. According to [1][9] cross-curricular activities in emerging areas by matching teachers to new programme and module definitely enhance the quality of learning and teaching in HE institutions [9]. Hence it becomes one of the most important target of today's demanding and diverse HE [16].

2.20 Higher education governance and management

Higher education institutions' governing bodies are responsible for ensuring the effective management of the institution and for planning its future development [3][9]. They are ultimately responsible for all the affairs of the institutions. Generally, they are responsible for approving institutional mission and the strategic plan, financial solvency, resourcing policy, employment and Human Resource (HR) policy and strategy, estates policy, senior appointments and remuneration, audit, legal compliance, determining educational character and mission and so on. They are facing challenges to effectively manage the institutions hence become one of the crucial challenges in HE [4][6]. To cope with this challenge, institutions need better leadership who will be able to provide academic freedom and will be able to make collective decision with the new requirements that is the necessity to make and implement important and often unpopular decisions in a timely manner [4][5]. In UK, ¹HEFCE aim is to work in partnership with the HE sector to ensure that the HE system is run in the most effective and efficient way to secure its own long-term sustainability and to maintain its world class reputation for excellence. ¹HEFCE have invested in improving leadership, governance and management in the Higher Education (HE) sector through the Leadership, Governance and Management (LGM) Fund.

3 CLASSIFICATION OF HIGHER EDUCATION CHALLENGES

In this section we classify the existing challenges of the Higher Education based on the interrelationship and influence among those challenges found in different literatures. We identified the relationship among the challenges and presented in table 1 where challenges (A) influences challenges (B) with references. We classify the challenges into 3 groups, where each group influences another groups to improve their quality and efficiency and also the challenges in the same group influence and interrelated to each other as well. Fig. 1 shows the classification of the challenges.

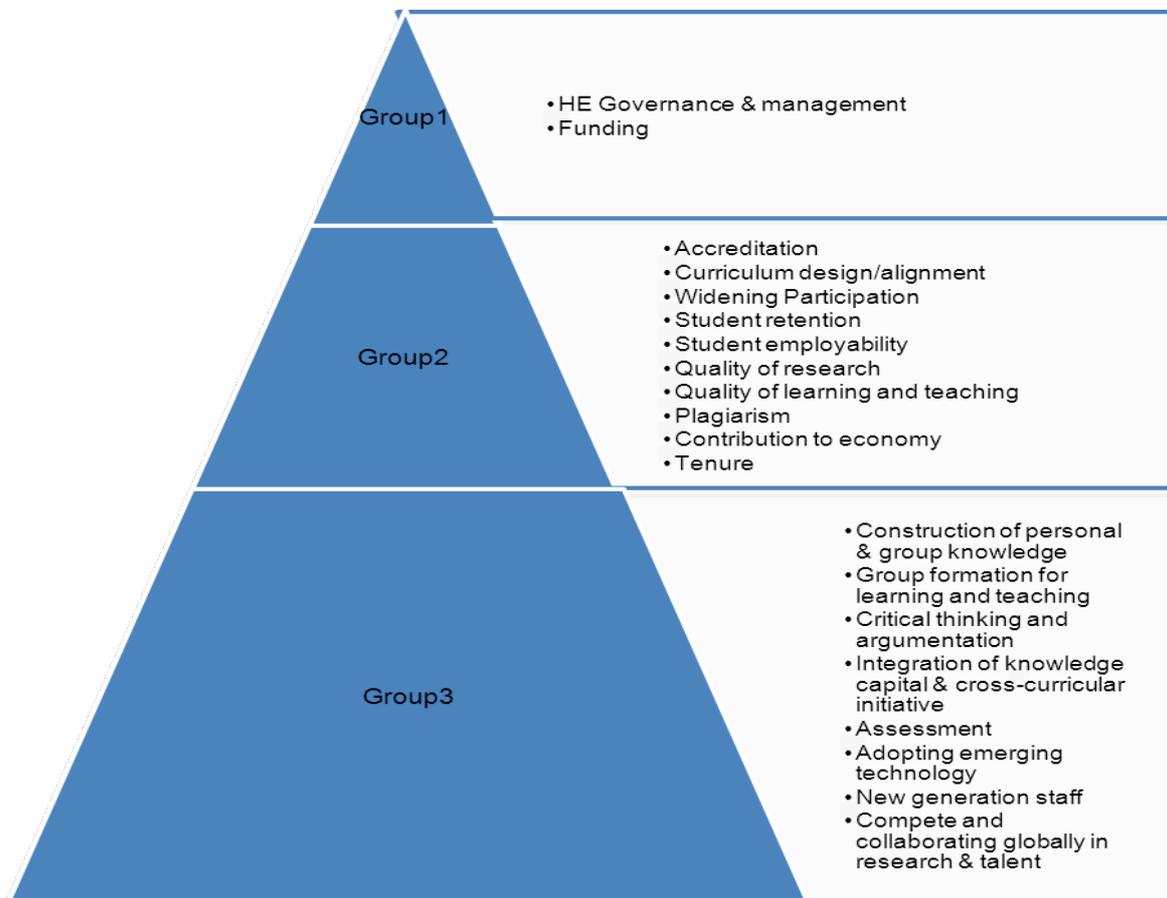


Fig. 1: Classification of Higher Education Challenges.

We group those challenges in a way if the challenge in the lower group improves their quality or efficiency then the challenges it influences in the upper group will automatically improve. Specifically, challenges in group3 influence the challenges in group2 and challenges in group2 influence the challenges in group1 and also if any of the challenges in group3 improve its quality or efficiency then the challenges influence or interrelated with/by this challenge will automatically improve their quality or efficiency. For example from table 1, assessment influences accreditation, quality of learning and teaching, student retention and plagiarism; hence we classify assessment in the lower group and all the challenges influenced by assessment classify in the upper group. That means in our classification assessment is in group3 and accreditation, quality of learning and teaching, student retention and plagiarism are in group2. In the same way we classify all other challenges. That is some challenges in group2 like student retention, quality of research, accreditation, widening participation influences funding in group1. While we found two challenges influence each other (both way) then we classify those challenges in the same group. In our classification we classify curriculum design/alignment and student employability in the same group (group2) because they influence each other (both way) and so on. We classified funding and HE governance and management as group1 as these two challenges are the higher level for consideration. Mostly from these two challenges we need support to improve all other challenges and that's why we did not turn these two to classify in any of the lower levels.

Table 1: Interrelationship of higher education challenges.

Challenges (A)	Relationship	Challenges (B)
Student Employability	influences	Curriculum design/alignment [2][5][16]; Widening participation [2][4][9][11][23]; Economic contribution [9];
Adopting emerging technology	influences	Curriculum design/alignment [13][22]; Widening participation [13]; Quality of learning and teaching [11][12][13][14][16]; Compete & collaborating globally in research [13][16]; Quality of research [4][5][13]; Tenure [4]; New generation staff [4][5][11]; Integration of knowledge capital & cross-curricular initiatives [13][14][16]; Construction of personal & group knowledge [16]; Plagiarism [18][22][25];
Accreditation	influences	Funding [21]; Curriculum design/alignment [21]; Quality of learning and teaching [3][6][21]; Widening participation [16][21]; Student Employability [21];
Curriculum design/alignment	influences	Widening participation [2][3][9][24]; Student Employability [2][3][8][9][24][16]; New generation staff [16]; Accreditation [5][16][22]; Student retention [23][24]; Plagiarism [18][19]; Quality of learning & teaching [3][4][9];
Funding	influences	Widening participation [3][4][6][9]; Quality of learning and teaching [3][5][6][8][9]; Quality of research [3][9]; Adopting emerging technology [5][13]; Compete & collaborating globally in research [9]; Plagiarism [25]; New generation staff [8][11]; Student retention [3][23];
Quality of learning and teaching	influences	Widening participation [3][4][8][9]; Student Employability [3][4][8]; Accreditation [24]; Tenure [4]; Student retention [3][23][24]; Plagiarism [18][22];
Student retention	influences	Widening participation [3]; Funding [24]; Accreditation [24];
HE governance and management	influences	Student Employability [2]; New generation staff [4][11]; Compete & collaborating globally in research and talent [3]; Tenure [11]; Plagiarism [18][19][25]; Adopting emerging technology [14];
Widening participation	influences	Student Employability [3][9][11]; Funding [8]; Student retention [23]; Plagiarism [19][22][25];
New generation staff	influences	Quality of learning and teaching [4][5]; Plagiarism [18][19][22][25];
Compete & collaborating globally in research and talent	influences	Quality of research [9]; Economic contribution [3]; Widening participation [3];
Quality of research	influences	Economic contribution [4][9]; Accreditation [16]; Funding [1][22];
Assessment	influences	Accreditation [19]; Quality of learning & teaching [24][26]; Student retention [22][23][24]; Plagiarism [18][19][22][25];
Group formation for learning & teaching	influences	Student retention [24]; Quality of learning & teaching [24];
Integration of knowledge capital & cross-curricular initiatives	influences	Quality of learning & teaching [3][4][5][13][14][16]; Quality of research [3][4][5][14][16];

4 TECHNOLOGY AND INSTITUTIONS' DATA INFRASTRUCTURES TO RESPONSE THE CHALLENGES

In this section we discuss how technology and Higher Education institutions' data infrastructure could respond to the HE challenges presented in the previous sections. Institutions' repositories can mostly be utilized to address the above mentioned challenges. An institution Repository (IR) is a digital archive of the intellectual product created by the faculty, research staff, and students of an institution and accessible to end-users both within and outside of the institution with few if any barriers to access. It will also house experimental and observational data captured by members of the institution that support their scholarly activities [21]. A significant amount of information is maintained by HE institutions in internal databases, VLEs (Virtual Learning Environments), file systems and internal or external Web pages. Such information may include teaching material, research material, admission data, course syllabi, learning outcomes and also documentation of the activities of the institution itself in the form of records of events and performance and of the ongoing intellectual life of the institution. There are many different technologies that support the storage and distribution of digital contents [20] including:

- Collection-based digital repositories managed by library professional
- Course management systems and associated file stores
- Collections of research data and reports managed by academic departments

- Students academic portfolio systems
- Institutional file storage systems
- Digital asset management workflow systems, or
- Web content management systems used by institutions or departments to store and stage Web content

The use of information across institutional repositories could be relevant to addressing important HE challenges. The content of these repositories can be available for integration within different departments of the institution, and can also be made available to colleagues and students at other institutions, as well as to the general public. HE institutions could start exposing such repositories in linked data formats starting with information that is already available on their Web pages. (e.g. course syllabi) to address the challenges. For example curriculum design/ alignment could be supported by establishing how different curricula across HE institutions compare to each other and identify potential gaps that new degree programmes could address, the research output of institutions could be more visible to potential funding bodies to attract funding, student retention could be supported by more efficient monitoring of student activities and assessment of their progress, institutional data, research output and course information could be visible for accreditation, course information and other information could be visible to attract more students to enroll and so on. Challenges could be addressed in groups, could we look at data infrastructures per group to address the challenges? It is clear that the institutional repository is a very powerful idea that can serve as an engine of change for institutions of higher education. If properly developed, it advances a surprising number of goals, and addresses an impressive range of challenges.

5 CONCLUSION

Higher education institutions are clearly in the midst of rapid change in response to environmental, social, economic, technological, and political transformations sweeping the globe. As a result universities are facing a number of challenges and we identified those challenges in this paper as presented in the literature. Addressing the challenges is critical not only for the future of institutions but also for that of the world at large. Institutional repositories consist of formally organized and managed collections of digital content generated by faculty, staff, and students at the institutions which can help us at this end. The potential of Institutional repositories across the Higher Education sector to address these challenges has been discussed in the previous section. Taking this forward requires institutional policies on exposing institutional data that could address the HE challenges. Further work and research to identify more precisely what information each institution should consider exposing to share across the institutions and what information should not be shared. Based on this classification future research could involve case studies and experimentation to test how effective this classification is to address the challenges? Moreover this could be development and availability of tools that will assist to efficiently address those challenges.

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