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STUDENTS' PERSPECTIVES ON FUNCTIONING OF SMART PLATFORMS: A STUDY OF SMART UNIVERSITIES OF HAZARA DIVISION, PAKISTAN

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ABSTRACT

The purpose of the recent study was to discover how students felt about how the smart systems in the universities in the Hazara Division function. The research's goals were (a) To evaluate the level of smartness of the Hazara Division's chosen universities with regard to e-classroom, e-learning, and assessment; and (b) to figure out what students thought of the universities' level of smartness with regard to resources, infrastructure, complete WI-FI coverage, and safe campuses. This was a survey study, and a questionnaire was used to collect data. The observation checklist was used to collect data about smart system resources and facilities from associated documents and the university's smart platform. A questionnaire was used to obtain data on the operation and quality of services (e-classroom, e-learning, and e-assessment) from university students. The study's target population includes all 6000 students of BS enrolled in universities of Hazara Division. 460 respondents were chosen for the study using multi-stage sampling approaches. The acquired data was examined statistically using the mean score, percentage, and frequency. The findings of this study may be helpful to policymakers of higher education in Pakistan in terms of creating several courses inside a single module, uploading and exchanging educational resources, and setting up alerts for due dates, class times, notifications, reminders, and templates that offer various information. Such findings may be helpful for the University's management and academics in developing improvement strategies for a smart process.

Keywords: Smart campus, IOT, Hazara Division, Students, Internet, HEC, learning.

INTRODUCTION

A Smart Campus is a creative and effective medium for teaching, research, administration, and campus survival, as a result it is an innovative and efficient platform for instructions, information, and ongoing education built on cyberspace electronics and provide helpful assistance (Thomas et al., 2013). With the help of technological breakthroughs, a smart campus can improve the standard of classroom instruction and student learning at colleges and universities. Additionally, this meshes using the concept given by Palma, Agudo, Sanchez, and Macias (2014) about "Smart Campus" as a facility which enables the campus's information acquisition, sharing, and services in order to promote a smart method for imparting scientific investigation, and activities. These applications involve the merging and combining of cloud computing, applications based on Geographic Information Systems (GIS), and Internet of Things. With billions of users worldwide, the Internet is the network of networks utilized for communication Gundewar, (2017) which is also relevant with a smart campus because it brings a lot of people together for educational purposes. Since each student has a unique learning

style and rate of comprehension, facilitation of this process is essential given that the professor is always teaching a large class of pupils. A smart campus provides a wide range of adaptive technological solutions that enhance student learning and their time on campus. For this, HEC, Islamabad (2017) had written that smart systems in universities have helped improve the environment for teaching, learning, and research in Pakistan.

In accordance with HEC, Islamabad (2020), the smart campus is required to uphold the legal rights given to the three key positions of teacher, student, and administrator. In other words, a smart campus not only improves the educational experience for students, but also makes them more employable. Adaptive advising technologies enable students to actively view their own "college roadmap" and choose the classes that will help them acquire the necessary skills and knowledge. Furthermore, if the equipment is turned off, in standby, or occupied, the HEC-designed classroom should dial out once more after the predetermined interval to automatically rejoin the courses. The class can be registered for online, through desktop software, or through mobile applications, as per pre-email reminders. These are essential aids for both students and teachers. All participants may be muted or unmuted, desktop sharing may be enabled, whiteboard content may be deleted, and polling regarding presentation and desktop content may be conducted. The student can share files and only invite specific classmates to the class when the teacher schedules the lesson. Using their username and password, students can join the class and the teacher can keep records of their attendance (HEC, Islamabad, 2020). Thus, a smart campus gives students access to these elements and gives them greater possibilities for success.

Three out of the four universities in Hazara Division now receive the designation of Smart University Campus. Information on the movements of vehicles, pedestrians, energy, water, hazardous materials, air quality indicators, transportation and distribution of products and services, and data are added to the focus on the physical footprint of buildings and other infrastructure. By utilizing the GPS inherent into personal mobile phones and tablets as well as the widely used geo-referenced sensor networks, information and communications technologies (ICT) are used to assemble and integrate such heterogeneous data. A near real-time assessment based on the dynamics of interrelated processes that connect physical resources with the flows that define the modern academic institution is possible with the help of improved two- and three-dimensional mapping at fine levels of temporal resolution and augmented reality simulations **(**Janelle, et al., 2014). The evaluation of these universities' smart systems is necessary for enhancing and establishing smart campuses and delivering the high-quality education required for the international workforce. Thus the smart campus facilitates students to take live classes and course recording. It can define the course's particulars, its intended audience, its classrooms, its schedule for each week and every month, as well as its beginning and ending times etc. There must be a unique operator account for every university. So only faculty and students that can be added to a university's interface are those who are already affiliated with that university.

According to HEC, Islamabad (2020), information provided within universities should be kept private, windows calendars should automatically import class schedules and provide email notifications. In order to prevent repetitions, departments as well as universities need to create e-learning that connects instantly with real, virtual, and productive instruction or vice versa. Class scheduling must be automatically recorded by default. Faculty members can see available classes on a smart campus before selecting one to enroll in. The faculty is given the ability to administer classes on a smart campus, including adding and removing classes and exporting class lists. At the specified time and day, the main classroom and the branch classroom automatically combine.

Various systems, such mixed studying, blossoming, distance and online learning, etc., have been developed in the past to experience the various taxonomies in order to increase performance, outreach, and instruction. However, it is imperative that the merger of both methods are used by combining a large number of gadgets with specific creative ways. This may be done in the classroom and with traditional video conferencing, where a variety of methods and strategies are individually examined. Consequently, the suggested smart classroom method strives to incorporate smart campus elements such as comprehensive ecological

consciousness, smooth networking, big data support, an accessible educational setting, and services tailored to teachers' and students' needs (Kiryakova, Yordanova, & Angelova, 2017). A variety of technological difficulties are raised by the adaption or use of shared resources in smart settings (Kray, Kortuem, Wasinger, 2004: Davidyuk, Sanchez, Gilman, Riekki, 2015). However, it also addresses user worries and sentiments about disclosing personal preferences or having an impact on others (Kray, Kortuem, Wasinger, 2004;, Niemantsverdriet, et al., 2016; Pakanen, 2016). As a result, systems are attempting to resolve all conflicts on their own. Instead, interfaces should make socially salient information visible, resulting in awareness and accountability in interaction (Niemantsverdriet, et al., 2016:, Niemantsverdriet, Essen, and Eggen, 2017). Smart spaces must ensure that user privacy is protected and that no sensitive or personal information is retrieved from or inferred about a person without that person's express consent. Obtaining user permissions to collect and use data in large shared places can be difficult, especially since not all visitors are eager to download a specific app to their mobile device. (Gilman. et al. 2020). The administrators of the universities in the Hazara Division may receive recommendations from the examination of the operation of the smart campus platforms there. Additionally, it might inform HEC of the necessity of enhancing the framework for smart universities and offer funds for support in order to fulfill the ideal requirements for knowledge and academia in order to match the changing requirements of the global network.

Consequently, research was done under the name "Students' Perspectives on Functioning of Smart Platforms: A Study of Smart Universities of Hazara Division, Pakistan.'

The study's objectives were as follows:

To assess the smartness of Hazara Division universities in terms infrastructure, campus safety, resources, and blanket WI-FI coverage.

To assess the technological proficiency of the Hazara Division's chosen universities with reference to e-classroom, e-learning, and evaluation.

Review of Related Literature

Smart Campus: Concept and Definition

A distinctive application that adheres to and uses internet of things standards is called smart campus (Ahmed Abdi, 2018). Many universities throughout the world have already embraced a variety of smart campus solutions, which are a growing business. Digital campuses serve as a foundation for the development of smart campuses (Abuarqoub et. al, 2017). With the present development in information and communication technology, the idea of a "smart campus" has become a reality. More and more people from all around the world are becoming interested in this advancement as an improved kind of intelligent education. The concept of smart universities has grown with the development of ICTs. IoT objects become intelligent by having intelligence embedded using some cutting-edge technologies, like wireless sensor networks (WSNs) and mobile communication technology (Abuarqoub et. al., 2017). Strategies and thoughts for smart universities have just been devised, which means they are now going through quick and flexible shaping, maturity, testing, and implementation and upgrading (Uskov, Bakken, Howlett, & Jain, 2018). SMART objectives, on the other hand, have become commonplace in evaluation and monitoring, and they have proven to be a tried-and-true, best-practice method for producing signals. (Vicent, 2013). In order to enable applications for creative usage, Gubbi et al. (2013) defined the Internet of Things (IoT) as a link among actuators and sensors that enables multi-platform exchange of information via a common framework also said by Kwok and Hui (2018). The Internet of Things (IoT) transformed everything from easy to tough for users when it secured one of the greatest human inventions, the internet. Along with commerce, transfer, fervor, nostrum, agriculture, and other endeavors, the Internet of Things also has a significant impact on learning. An efficient system of universities might be a perfect place to construct an elegant home.

A smart campus is built on an all-encompassing, reliable outdoor as well as indoor wireless as well as wired connectivity. Even though achieving this degree of connectivity may have once been a challenging objective for many universities, a Smart Campus is just getting started (Cinco et al., 2012). To link, integrate, and exchange three primary dimensions of learning resources—learning

collaborators, learning contents, and learning services—a smart learning environment offers a pervasive, interoperable, and seamless learning architecture (Svetlana and YongIk, 2009, and Zixue, 2005). According to Ng (2010), a smart learning environment typically consists of the following elements: a collaborative student care system, real-time remote distant learning, user-on-demand course delivery and evaluation, interactive cross-varsity lectures, and online materials tailored course program. Smart campuses are an essential component of the smart city idea as they generate intellectual educational spaces that transform residents into smart professionals.

Importance of Smart Campus

LMS is a learning management system which has a variety of definitions, is primarily computer software designed to make it easier to manage and keep track of training activities (Adzharuddin & Ling, 2013). Cinco et al. (2012) argued that even though it's difficult to get, a powerful LMS/CMS accomplishes the following:

Make effective use of self-help and self-direction services.

Employ personal assistance and automated capabilities.

Unite teaching professionals on a worldwide internet-based system.

Joint instruction programs on a worldwide digital platform.

By use of electronic mail, group conversations, and teacher-student communication, LMS extends beyond the classroom and allows for the display and transfer of additional information and content (Kim & Lee, 2016). Whether they are seated students can take part in this at their residence room, the library, or the quad. When all students have continuous usage of audio and video communication abilities they can all swiftly join a group task. Students can work together on a project without physically being there by using screen-casting capabilities and file- and application-sharing tools on their devices (such as Google Docs, Office 365, Box, etc.). Most higher education institutions already employ digital learning management systems (LMS) like Instructor and Blackboard (Jost, 2016). Application development, data warehouses, and business systems can all access information (Follet, 2016). Since a Smart Campus provides commonplace, strong wired and wireless service everywhere, learners may readily use any personal device to visit such websites anytime they desire. It is only the beginning of a Smart Campus, although it's possible that degree of connectivity was a goal in and of itself for many universities. When every person, device, and application on campus utilizes the same digital infrastructure, they may interact to create experiences and efficiencies that were previously impossible (Ahmed Abdi, 2018). Students have access to everything if they're gaining knowledge in a residence hall or enjoying the quad in the sunshine. In terms of levels, tasks, submitting assignments, as well as online exam. Access to robust computational tools is necessary for students seeking degrees in science, engineering, and computer science today. They perform a task for a predetermined time spent at a location (Vovides, Sanchez-Alonso, Mitropoulou, & Nickmans**,** 2007).

HEC Pakistan's Smart University Campus Project

Higher education continues to receive assistance in Pakistan through the Higher Education Commission, HEC (2020). The implementation of the ICT strategy of HEC, which is composed of numerous interconnected components, aims to promote an academic culture throughout the nation, Higher Education Institutes (HEIs) and HEC have introduced a number of initiatives to encourage and enable higher education institutions to build cutting-edge ICT-driven research and academic environments throughout Pakistan. The campuses are connected by the Pakistan Education & Research Network's (PERN) which is high-speed backbone, and these programs include modern computer capabilities, digital scholarly content, information portals, corporate automation tools, software, and interactive communication services.

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Components of a Smart University Campus

By 2020, 50 billion autonomous items are predicted to exist in the planet, creating an unique information ecosystem (Farhangi, 2016). ICT is utilized to support rather than replace educational practices in many cases (Cuban, 2013). Technology and education have a long and deep relationship. The administration of resources and the management of teaching and learning are highly interdependent, according to an operational viewpoint. For instance, the academic staff often consists of both teaching and research workers. As a result, initiatives to integrate software for managing a university's administrative tasks with academic learning platforms have appeared in literature and practice (Brune, 2009).

The teaching and learning environment is built around suitable technology that facilitates student interaction, aids in the mobilization and processing of thoughts, and aids in connecting those concepts to the environment in which they are being used. The emergence of the digital age, the internet, and computers during which governments committed to provide every child access to a technology—accelerated these challenges (Jost, 2016). A local area network (LAN) that connects the campus's network frameworks is an example of a network structure (Ahmed Abdi, 2018). Universities are collaborating to improve student learning results. In order to connect various departments and classes, the Internet makes use of a number of technologies. To maintain its effectiveness, though, as machines get increasingly smarter, more is required.

Devices for remote communication, control, servers, and routing are all included in the IOT hardware. In order to serve certain goals, the hardware's primary functions include system activation, action specification, security, communication, and detection. Sensors, a router, and a switch are some of the physical components employed in this smart campus system. However, a software system that provides a platform for the devices to operate makes it possible for these devices to be connected to one another. Additionally, it integrates the gadgets and gathers data across a wide area network (WAN) (Ahmed Abdi, 2018). In classes with a large number of students, taking attendance is thought to be the process that takes a lot of time.

For students and staff, automated attendance tracking would save time and eliminate human errors in recording student attendance (Abuarqoub et al., 2017). Same is said by Kane et al. (2016), that keeping track of enrollment is thought to require the greatest time task, particularly in classes with a big number of students. Human error is eliminated and transcription time is decreased with automated staff and student attendance tracking. Classrooms can use smart IOT devices to create an automated environment that is very appealing (Ahmed Abdi, 2018).

RESEARCH METHODOLOGY

This study employs a quantitative approach as Johnson and Christensen (2004) claim that it offers an accurate and comprehensible depiction of the state of affairs at the moment because it is descriptive research. As stated by Nasser (2011), descriptive research combined with quantitative survey methods of research are frequently employed in numerous domains, including psychology, education, and other social sciences. In order to explain a current situation and utilizing a quantitative research approach, examine the cause-and-effect relationship between the variables, said by Gay (2009). So in order to test the functionality of smart university platforms in particular universities, a structured questionnaire for students was employed.

Sample of the Study

To collect samples for the study, multi-stage techniques for sampling were applied. In the first phase, six departments from each university (Hazara University, University of Haripur, and COMSATS) were chosen using a practical sampling technique. The second stage involved the random selection of students from randomly selected departments. In this way out of 6000, only 460 students make up the sample for this study. According to Gay (2009), a sample size of 400–500 people is sufficient when the population is greater than 5000. As a result, the

proposed sample fulfills the requirements of this study.

Research Instruments

The researcher gathered data relevant to the study's goals by having students complete up a questionnaire. After a thorough analysis of the relevant literature, the research tool was developed under the supervision of the supervisor. 42 items and 9 factors made up the students' questionnaire. From a great extent to not at all, a five-point scale was used to score each item. The following sections are included in the list: vision and mission (5 items), usability (6 items), classroom learning (7 items), assessment (4 items), feedback for student learning (4 items), interaction and communication (4 items), accessibility and reliability (4 items), hardware (4 items), and software (4 items).

The experts were asked to review the questionnaire in order to validate the research topic and research objectives before presenting it to them. They examined the proposed documents and gave them their approval. Before conducting the pilot test, their suggested modifications were taken into account. Pilot testing is the pre- or trying-out of a particular research tool (Baker, 1994). In order to eliminate any potential ambiguity in the questionnaire, a pilot study was conducted. Respondents who did not make up the sample but were a part of the population were given the questionnaire. After receiving input from respondents during the pilot testing phase, the questionnaire was improved. The students' questionnaire was determined to have a 0.75 reliability rating.

DATA ANALYSIS

The information gathered from the chosen universities via the questionnaire was classified and marked using a Likert scale of five points, with the values of 5, 4, 3, and 1 denoting To Great Extent, Moderate, Do not know, To Some Extent, and Not at All, respectively. As statistical methods, percentage, mean, and frequency analysis were used to examine the data gathered through surveys.

RESULTS

Table No. 1

The potential of the university's smart campus platform to support online learning

S. No.	Statements (To what degree is the smart campus platform effective)	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	To outline the specific topics that will be covered in a course or lecture.	0 (0%)	109 (30%)	151 (42%)	66 (18%)	34 (9%)	2.93
2	To develop various educational tasks.	168 (47%)	63 (18%)	1 (0.2%)	87 (24%)	41 (11%)	3.64
3	To compile the report on the involvement of the students in class and group discussions.	147 (41%)	122 (34%)	1 (.3%)	63 (18%)	26 (7%)	3.83
4	To submit or attach assignments or papers.	183 (51%)	110 (31%)	1 (0.3%)	63 (18%)	3 (1%)	4.13
5	To use an electronic class roster to record attendance.	136 (38%)	93 (26%)	1 (.3%)	99 (28%)	30 (8%)	3.57
6	To choose a class from a list and register.	102 (28%)	100 (28%)	54 (15%)	90 (25%)	13 (4%)	3.52

Table 1 show that the most of respondents (DNK= 42% and Mean score = 2.9) do not know whether the university's smart campus platform is useful for detailing the material that will be taught in a class or lecture, with 30% of respondents believing it to be mostly helpful and 18% believing it to be helpful occasionally. And more than half of the respondents (TGE=47%, M=18%, and Mean score=3.6) saw the university's smart campus platform as mostly functional for enabling them to create various learning activities, while 24% of respondents found it occasionally useful in this sense. Similar to this, the majority of respondents (TGE= 41%, M= 34%, and Mean score = 3.8) concurred that the university's

smart campus platform was largely functional in allowing them to compile reports on students' involvement in class activities and group discussions. The smart campus platform of the institution was seen useful primarily for enabling submission/attachment of documents/assignments, as agreed upon by the majority of respondents (TGE= 51%, M= 31%, and Mean score = 4.1), with only 18% finding it occasionally functional.

Furthermore (38%) of respondents with a mean score of 3.5 agreed that the university's smart campus platform was primarily functional for permitting them to use a computerized class roster for attendance tracking, and 26% of respondents said it was only passably functional and 28% thought it was occasionally functional. And (28%) of the respondents (Mean score=3.5) found the university's smart campus platform to be mostly functional for letting them register for classes from a list, (28%) respondents found it to be functional in this regard, and (25%) respondents found it to be occasionally functional.

Table No. 2

Students' opinions about university's smart campus platform's e-learning feature

S. No.	Statements (The degree of functionality of the smart campus platform)	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	To access the lectures and videos at anytime from anywhere.	39 (11%)	168 (47%)	152 (42%)	1 (.2%)	0 (0%)	3.68
2	To access the course contents and learning materials.	184 (51%)	76 (21%)	26 (7%)	74 (20%)	0 (0%)	4.03
3	To participate in online quizzes and discussion sessions arranged by the teacher.	181 (50%)	64 (18%)	1 (.3%)	34 (10%)	80 (22%)	3.96
4	To control the dates on which students must turn in their homework and assignments.	154 (43%)	105 (29%)	1 (0.3%)	100 (28%)	0 (0%)	3.87
5	To use online Q&A forums or lengthy lectures to help explain the more complex ideas.	169 (47%)	121 (34%)	1 (.3%)	60 (17%)	9 (3%)	4.06
6	To work in groups on different tasks/projects	184 (51%)	130 (36%)	3 (.8%)	41 (11%)	1 (.3%)	4.26
7	To have experience of interactive learning on different topics.	180 (50%)	138 (38%)	1 (.3%)	40 (11%)	0 (0%)	4.27

Table No. 2 shows that 42% of respondents were unaware of this and 11% believed the university's smart campus platform was functional, nearly half of the respondents (M= 47% and Mean score = 3.6) agreed that it was only moderately functional in terms of enabling them to access the lectures and videos whenever they wanted from anywhere. Accordingly, over half of the respondents reported that the university's smart campus platform was largely operational (TGE=51% and Mean score = 4.0), while 21% and 20% of respondents thought it was moderately and occasionally functional in this regard. Similarly the majority of respondents (TGE=50%, M=18%, and Mean score = 3.9) we're in the favour that university's smart campus platform was mostly functioning to allow them to take part in teacher-led online discussions and quizzes. It was also observed that 28% of respondents thought the university's smart campus platform was occasionally functional, and approximately 72% of respondents (TGE=43%, M=29%, Mean score=3.8) agreed that they could regulate when students turned in their homework and how much time they had to do it. The data also shows that most respondents (TGE=47%, M=34%, Mean score=4.0) thought the university's smart campus platform did a good job of helping

them understand difficult subjects through long lectures or online Q&A sessions. According to the data analysis, most respondents (TGE=51%, M=36%, and Mean score=4.2) felt that the university's smart campus platform was mostly successful in enabling students to work in groups on various tasks and projects, it also shows that 88% of respondents (TGE=50%, M=38%, Mean score=4.2) said they could participate in interactive learning on a range of topics thanks to the university's smart campus platform.

Table No. 3

Students' opinions on how the university's smart campus platform functions in terms of giving feedback to aid in their learning.

S. No.	Statements (The degree of functionality of the smart campus platform)	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	To let students know how they did on a test, an assignment, or other learning task.	172 (50%)	157 (44%)	0 (0%)	30 (8%)	1 (.3%)	4.31
2	To upgrade one's overall educational standing.	146 (41%)	179 (50%)	1 (.3%)	34 (10%)	0 (0%)	4.21
3	To view other students' performances.	196 (55%)	144 (40%)	1 (.3%)	19 (5%)	0 (0%)	4.21
4	To notify students who are in danger.	146 (41%)	179 (50%)	1 (0.3%)	34 (10%)	0 (0%)	4.21

Table no. 3 underscores that a substantial 50% of the respondents, with a Mean score of 4.3, regarded the university's smart campus platform as primarily effective in keeping students informed about their performance in quizzes, assignments, and learning tasks, while 44% of respondents found it to be moderately effective in this respect. Furthermore, it indicates that the majority of respondents (TGE=41%, M=50%, and Mean Score=4.2) believed that the smart campus platform effectively served its purpose in updating their overall academic performance, with only 10% of respondents considering it occasionally useful for this purpose. It clarifies that 55% of the respondents found the university's smart campus platform to be predominantly effective in allowing them to view the performance of their fellow students, while 40% viewed it as moderately functional, and 5% found it somewhat functional in this regard. Lastly, a substantial 91% of respondents considered the smart campus platform to be effective in sending alerts to students at risk, with only 10% viewing it as occasionally functional in this context.

Table No. 4

Opinions of students about how the university handles assessments

S. No.	Statements (How functional is the smart campus platform?)	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	To consistently stay conscious of one's own performance.	170 (47%)	169 (47%)	1 (.3%)	20 (6%)	0 (0%)	4.36
2	To give students timely feedback regarding the caliber of their assignments, exams, quizzes, etc.	171 (48%)	98 (27%)	1 (.3%)	51 (14%)	39 (11%)	3.87
3	To give pupils access to a highly useful grade book where they may view their results across many tasks.	177 (49%)	94 (26%)	1 (.3%)	69 (20%)	19 (5%)	3.95

4	To evaluate the effectiveness of a course's teachers.	184 (51%)	122 (34%)	1 (0.3%)	33 (9%)	20 (5%)	4.16

Table No. 4 reveals that a significant majority of the respondents (TGE=47%, M=47%, and Mean Score=4.3) considered the university's smart campus platform as primarily effective in keeping them continuously informed about their personal performance. Similarly, most of the respondents (TGE=48%, M=27%, and Mean Score=3.8), the smart campus platform of the university was predominantly functional in providing timely comments to students regarding the caliber of their homework, exams, quizzes, etc. Furthermore, for a substantial number of the respondents (TGE=49%, M=26%, and Mean Score=3.9), the smart campus platform effectively operated as incredibly useful grade book where students may view their results on various assignments, although 20% of respondents viewed it as occasionally functional in this regard. Lastly, half of the respondents (TGE=50%, Mean Score=4.0) found the 34% of respondents said the university's smart campus platform was mostly functional for evaluating the caliber of teachers' teaching in a course, while 9% said it was occasionally functional for this purpose.

Table No. 5

Student' opinions regarding how the smart campus platform facilitates communication and interaction

S. No.	Statements (The degree of functionality of the smart campus platform)	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	To receive notifications about upcoming dates, class schedules, announcements, prompts, and templates with other information.	141 (39%)	87 (24%)	2 (.6%)	95 (27%)	35 (10%)	3.56
2	To offer a calendar that details assignments, deadlines, and activity plans throughout the course of the semester.	148 (41%)	66 (18%)	3 (.8%)	83 (23%)	60 (17%)	3.43
3	To offer efficient, adaptable communication tools (such as email, chat rooms, and bulletin boards, instant messaging, and threaded discussions, among others).	177 (49%)	99 (28%)	1 (.3%)	55 (15%)	29 (8%)	3.69
4	To encourage cooperation between institutions that are sister institutions.	219 (61%)	59 (16%)	1 (0.3%)	69 (19%)	12 (3%)	4.12

Table No. 5 highlights that a mere 39% of respondents, with a Mean score of 3.5, strongly agreed that the university's smart campus platform was primarily effective in delivering alerts related to deadlines, class schedules, announcements, reminders, and various templates for disseminating information. In contrast, 24% moderately agreed with this functionality, while 27% of respondents considered it occasionally functional for such purposes. Turning to the data analyzed, it becomes apparent that a substantial 60% of respondents (TGE=41%, M=18%, and Mean Score=3.4) believed that the smart campus platform was predominantly functional in providing a calendar that communicated due dates, checkpoints, and activity schedules throughout the semester. Additionally, it reveals that for the majority of respondents (TGE=49%, M=28%, and Mean Score=3.6), the university's smart campus platform was largely effective in offering versatile communication tools such as chat rooms, email, bulletin boards, instant messaging, and threaded discussions. Only 15% of respondents viewed it as occasionally functional for such communication. Lastly, it also shows that a significant majority of respondents (TGE=61%, M=16%, and Mean Score=4.1) believed that the smart campus platform effectively facilitated cooperation with other sister

institutions, but 19% of respondents thought it was rarely useful for this aim.

Analysis of data regarding accessibility and reliability

Data on the accessibility and reliability of the Learning Management System/Content Management System (LMS/CMS) for providing technical assistance were collected from respondents and analyzed. The results of this analysis are presented in Tables 6, 7, and 8, which provide insights into the perceptions and experiences of respondents regarding the LMS/CMS in this contxt.

Table No. 6

Students' opinions about how the university's smart campus platform operates in terms of accessibility and reliability

S. No.	Statements (How functional is the smart campus platform?)	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	Technical support is offered seven days a week, twenty-four hours a day.	148 (41%)	70 (20%)	0 (0%)	112 (31%)	30 (8%)	3.53
2	Fast internet and a high-speed system support LMS/CMS.	165 (46%)	73 (20%)	0 (0%)	71 (20%)	51 (14%)	3.63
3	Use behavior-based alerts to notify campus security when it is open and closed.	175 (49%)	45 (13%)	1 (.3%)	95 (27%)	44 (12%)	3.59
4	Provides services without any error.	111 (31%)	61 (17%)	1 (0.3%)	147 (41%)	39 (11%)	3.16

Table No. 6 indicates that a significant majority of respondents (TGE=41%, M=20%, and Mean Score=3.5) found the university's smart campus platform to be primarily functional in providing technical support is offered seven days a week, twenty-four hours a day. However, 31% of respondents considered it occasionally functional in this regard. Regarding, the analysis reveals that for most of the respondents (TGE=46%, M=20%, and Mean Score=3.6), the smart campus platform effectively supported the LMS/CMS through a high-speed system with fast internet, though 20% of respondents viewed it as occasionally functional for this purpose. It also shows that a majority of respondents (TGE=49%, M=13%, and Mean Score=3.5) found the smart campus platform functional in using behavior-based alarms to alert campus security during on and off hours. However, 27% of respondents considered it occasionally functional, and 12% found it not functional in this regard. Lastly, for less than half of the respondents (TGE=31%, M=17%, and Mean Score=4.1), the smart campus platform of the university was functional in providing services without any errors. A significant 41% of respondents considered it occasionally functional in this context.

Table No. 7

Students' opinions on the functioning and availability of hardware

S. No.	Statements	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	Multimedia/projectors mounted at celling.	157 (44%)	96 (27%)	1 (0.3%)	56 (16%)	50 (14%)	3.71
2	Interconnected laptops or desktops.	142 (40%)	103 (29%)	4 (1%)	76 (21%)	34 (10%)	3.68
3	Smart boards/interactive white boards.	168 (47%)	82 (23%)	1 (.3%)	78 (22%)	30 (8%)	3.77
4	Networked computers and audio visual aids.	142 (40%)	93 (26%)	2 (0.6%)	77 (21%)	45 (13%)	3.58

Table No.7 indicates that, for a majority of respondents (TGE=44%, M=27%, and Mean Score=3.7), the university's smart campus platform was effectively equipped with ceiling-mounted multimedia/projectors And. for most respondents (TGE=40%, M=29%, and Mean Score=3.6), the university's smart campus platform was primarily functional for connecting laptops or desktops, while 21% of respondents found it occasionally functional in this regard. The analysis shows that, for a significant majority of respondents (TGE=47%, M=23%, and Mean Score=3.7), the university's smart campus platform was predominantly functional in providing smart boards/interactive whiteboards. However, 22% of respondents considered it sometimes functional in this respect. Finally, for most respondents (TGE=40%, M=26%, and Mean Score=3.5), the smart campus platform of the university was functional in offering networked computers and audio-visual aids. Nevertheless, 21% of respondents found it occasionally functional, and 13% considered it not functional in this regard.

Table No. 8

Smart campus platform's functionality associated with software

S. No.	Statements (The degree of functionality of the smart campus platform.)	Responses					Mean Value
		TGE	M	DNK	TSE	NA	
1	System/software for creating presentations and exercises as a prerequisite for before-class learning (computer screen capture and video capture).	157 (44%)	96 (27%)	1 (0.3%)	56 (16%)	50 (14%)	3.71
2	System/software for smooth collaborative learning, particularly for digital content and material exchange.	142 (40%)	103 (29%)	4 (1%)	76 (21%)	34 (10%)	3.68
3	Software/System to relay noted activities and lectures.	168 (47%)	82 (23%)	1 (.3%)	78 (22%)	30 (8%)	3.77
4	Web-based collaborative system for communication.	142 (40%)	93 (26%)	2 (0.6%)	77 (21%)	45 (13%)	3.58

Table No. 8 indicates that, for the majority of respondents (TGE=44%, M=27%, and Mean Score=3.7), the university's smart campus platform was working in providing a software/system for developing activities and presentations before to class requirements, including methods for recording computer screens and videos. Moreover, for most respondents (TGE=40%, M=29%, and Mean Score=3.6), agreed that providing a system/software for smooth collaborative learning, particularly for digital content and material exchange, was the main function of the university's smart campus platform in this regard. However, 21% of participants said it was occasionally functional. The analysis reveals that, for a significant majority of respondents (TGE=47%, M=23%, and Mean Score=3.7), the university's smart campus platform was predominantly active in giving software/system for relaying noted activities and lectures. However, 22% of respondents found it as occasionally functional in this regard. Lastly, for most respondents (TGE=40%, M=26%, and Mean Score=3.5), the university's smart campus platform worked well, offering a web-based collaborative communication system. However, 21% of respondents found it occasionally operational in this respect.

FINDINGS

A major area of functionality for the university's smart campus platform related to facilitating interaction and communication. Over 60% of respondents agreed that the platform enabled useful alerts, calendars, collaboration tools, and templates for information sharing. Mean scores consistently indicated agreement that these features enhanced organizational and communicative affordances. However, some components like detailed course

content summaries were still unfamiliar or only partially utilized by students and faculty.

In terms of accessibility and reliability, most respondents affirmed the 24/7 availability of technical assistance and admired the high-speed internet and robustness of the smart campus system. Over half noted effectiveness of campus safety alerts and glitch-free performance of services, underscoring system stability. But a segment of students faced some platform errors, suggesting potential improvements needed foroptimal accessibility.

Regarding hardware and software provisioning, approximately 70% of respondents endorsed availability of multimedia equipment like projectors, laptops, smart boards, and audio-visual technologies across smart classrooms. Equal proportions confirmed seamless software systems enabling recorded lectures, content sharing, presentations, and collaborative devices. However, around 15% highlighted hardware or software deficits, indicating scope for better infrastructural equipping and platform updating to aid teaching-learning.

Conclusion and Discussions

The main uses of the smart campus platform are to create many courses within one program, upload and exchange educational materials, and have notifications for deadlines, class schedules, notifications, reminders, and templates that offer various types of information.

The university's smart campus platform functions skewedly to keep students, instructors, and administration informed, thereby facilitating collaborative work across campus. Partially functionalities of the smart campus platform (LMS/CMS) include the ability to export courses and content from one location to another with great flexibility for communication via chat, email, instant messaging, and discussions. With its ceiling-mounted multimedia/projectors, networked PCs, smart boards/interactive whiteboards, connected laptops or desktops, and audiovisual aids that assist teachers and students in planning teaching-learning activities, the smart campus platform is only somewhat effective. The university’s smart campus platform in Hazara Divion's is operational, offering software and systems to expand and record lectures and activities as a prerequisite for pre-magnificence (video recording and laptop screen capture). The university's smart campus platform is striving to create a system/software for seamless digital content sharing and material sharing, as well as learning portals and collections of online educational materials. While the university's smart campus platform is useful for creating a variety of learning activities, such as recording students' participation in group discussions and learning activities, submitting and attaching documents and assignments, tracking attendance through an electronic class roster, registering from a list of classes, organizing course materials and quizzes, supervising research students, assigning homework, and using a variety of teaching techniques to make instruction engaging and effective. The smart campus platform of the university effectively notifies students about their progress on quizzes, assignments, and learning activities, as well as the course contents, learning resources, and videos, at any time and from any location. The university's smart campus platform also works to let students take part in online tests and teacher-organized discussion sessions. Finally, it allows students to collaborate in groups on various projects so they may get hands-on experience with interactive education covering a range of subjects. The university's smart campus platform is functioning well to help students stay informed about their own performance through the use of a very useful grade book that allows them to view their results across a variety of activities and evaluate the caliber of instruction from their teachers.

The goal of the research was to determine how the universities in the Hazara Division's smart campus platform operated. The study's findings showed that the Hazara Division universities' smart campus platform was primarily effective at creating multiple classes within a single course, uploading and sharing educational materials, and providing alerts for deadlines, class schedules, notifications, alerts, and formats that offered various types of information. These results are in line with those of Gubbi et al (2013). Gubbi et al. (2013) described the Internet of Things (IoT) as a link between sensors and actuators that provides information interchange across platforms via a standard design, hence enabling applications for creative utilization. Additionally, it

was discovered that the Hazara Division institutions' smart campus platform was largely operational in terms of offering efficient tools for adaptable communication (such as chat rooms, email, bulletin boards, texting, and twisted discussions, among others). The proposed smart classroom method aims to incorporate smart campus elements like comprehensive awareness of the environment, smooth networking, big data support, a public education environment, and services designed with both educators' and students' needs in mind. Additionally, it makes working with other sister institutions easier, which is consistent with Kiryakova, Yordanova, and Angelova's (2017) research findings. Rich content (podcasts, videos, presentations, etc.) was being uploaded by the smart system (LMS/CMS), which is consistent with the results of a study done by (Kim & Lee, 2016). Beyond the classroom, LMS enables the presentation and transmission of extra information by email, group chat, and teacher-student communication. Furthermore, the Hazara Division institutions' smart campus platform was essentially up and running, supporting LMS/CMS with a fast internet connection and behavior-based alerts to notify campus security whether campus security is on or off. At any given time, more than 10,000 connections were established with users running a variety of operating systems. (Windows, Mac, Linux, etc.) and offering automatic assistance to students. These results are in line with those of Jost (2016). According to this study, the smart campus platform in the universities of the Hazara Division, which included interactive whiteboards, smart boards, and multimedia projectors hung on the ceiling, was only moderately functional. These results bear some resemblance to those of Cinco et al (2012). The study's findings showed that the Hazara Division institutions' smart campus platform, which included networked computers and audio-visual aids to help professors and students plan teaching-learning activities, was only partially functioning. These results bear some resemblance to those reported by Jost (2016). The Hazara Division institutions' smart campus platform was only partially operational, offering software and systems for smooth collaborative learning through digital content sharing, learning portals, and repositories of digital learning materials. These results run counter to those of Kiryakova, Yordanova, and Angelova (2017). Similar to this, the Hazara Division institutions' smart campus platform worked well for developing various learning activities, such as reporting on students' involvement in class activities and group discussions and allowing them to turn in assignments and attach documents. These results bear comparison to those of Gilman et al. (2020). The survey also showed that the Hazara Division universities' smart campus platform worked well for electronically recording attendance. These results are in line with those of studies carried out by Abuarqoub et al. (2017). Additionally, the Hazara Division universities' smart campus platform allowed students to register from a list of classes, manage homework and assignments, set up quizzes and discussion sessions, teach and supervise research students, and organize course materials and content. These results are in line with Follet's (2016) findings. The study's findings showed that the Hazara Division universities' smart campus platform allowed for the utilization of a variety of instructional pedagogies and styles to enhance student engagement and effectiveness. These results are in line with those of Cino (2012). Additionally, it functioned to provide students with information about their performance on quizzes, assignments, and learning tasks as well as course materials, videos, and learning resources at any time and from any location. These results are in line with findings of Ashton (2009). The study's findings also showed that the Hazara Division universities' smart campus platforms were operational, allowing students to take part in online tests and teacher-organized discussion sessions. The platforms also controlled when and how students turned in their homework and assignments. These results are in line with Vicent's (2013) findings. The study's findings showed that the Hazara Division universities' smart campus platform was able to generate individual student reports when needed, track individual contributions to group projects and combined assignments, and notify teachers about completed assignments and materials used by their students. It also gave teachers complete access and control over completed courses and related materials. These results are in line with those of Kim and Lee (2016).

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