

Academic Result Checking and Dissemination in Tertiary Institutions: A Comparative Review of Existing Approaches

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ARTICLE INFO

Received: 04 Aug 2026

Accepted: 20 Sept 2026

Published: 02 Oct 2026

ABSTRACT

Timely and convenient access to academic results remains an important requirement in tertiary institutions, particularly where students depend on conventional notice boards or single-channel electronic systems. This study presents a review and comparative analysis of existing approaches to academic result checking and dissemination, with emphasis on web, Short Message Service (SMS), Unstructured Supplementary Service Data (USSD) and electronic mail (email)-based systems. A structured narrative review was adopted to identify, examine and compare relevant studies based on system purpose, access channels, communication mode, authentication, functionality, accessibility, security, and system limitations. The findings indicate that existing systems have improved result accessibility, but many rely on a single communication channel and provide limited integration of complementary access mechanisms. The review also reveals an important distinction between result processing and result dissemination, as well as between student-initiated pull-based access and system-initiated push-based notification. Web systems are suitable for detailed result retrieval, while SMS and email provide useful mechanisms for timely notification. These findings informed the practical consideration of a Multi-Channel Result Checking System (MCRCS) in Rufus Giwa Polytechnic, Owo, Ondo state, Nigeria where an existing Result Processing System serves as the source of approved results and the dissemination layer provides SMS and email notifications. The study concludes that integrating complementary communication channels can improve accessibility and reduce dependence on a single medium. Future research should evaluate multi-channel systems using common measures of usability, security, reliability, response time, delivery success and user satisfaction across different tertiary institutions.

Keywords: Academic results, result checking, SMS, email, multi-channel system

INTRODUCTION

The management and dissemination of students' academic results are important activities in tertiary institutions. Academic results provide information about students' academic progress and support decisions relating to progression, graduation, transcript processing, and other academic and administrative activities. Traditionally, many institutions have disseminated results through notice boards, printed documents, and manually managed records. Such approaches can lead to delays, congestion, increased administrative workload, and concerns about privacy, especially when large numbers of students require their results at the same time.

The adoption of information and communication technologies has provided alternative approaches to academic result management. Computerized systems have made it possible to store academic records in databases and provide students with electronic access to approved results. Studies have reported the development of online examination and student-result systems to improve the storage, retrieval, management, and accessibility of academic records (Agushaka et al., 2021; Ibrahim & Ebole, 2020; Sahu et al., 2021). However, electronic access is not equally convenient for all students, particularly in environments where internet connectivity, cost, or availability of suitable devices may be limiting factors as is often the case in developing countries.

These challenges have encouraged the use of mobile communication technologies, particularly Short Message Service (SMS), as an alternative or complementary means of providing academic information. Adagunodo et al. (2009) developed an SMS user-interface result checking system, demonstrating that students could obtain examination results through their mobile phones. Awodele et al. (2009) subsequently proposed an improved SMS-based result checking system with attention to accessibility and security. Kijazi (2016) also investigated the integration of an SMS gateway with an academic records management system, demonstrating the potential of combining mobile communication with existing academic information systems (Simanjuntak, 2021). Vamshi Krishna & Sakthivel (2022) study supported student portal as a means of an online platform for students.

More recent researches have extended mobile-based result access to USSD and SMS services, particularly for resource-constrained environments. Badamasi et al. (2023) evaluated a mobile USSD-SMS interactive result checking system using the System Usability Scale, highlighting the importance of usability when alternative access channels are provided. Similarly, Olaniyan et al. (2025) examined an SMS-based academic result notification system, with emphasis on security, scalability, and result delivery. These studies show that mobile technologies can complement conventional electronic approaches and provide students with additional means of receiving academic information.

The increasing availability of different communication technologies has created the possibility of multi-channel academic result checking/dissemination, in which two or more channels are integrated within the same system. A multi-channel approach can combine the detailed information available through the accessibility of mobile messaging and the convenience of email. The channels, however, do not necessarily perform the same function. SMS and email may provide push-based notifications or result information following the release of approved results.

Despite the growing body of research, the literature remains fragmented. Existing studies have largely examined individual technologies or particular combinations of channels, with considerable differences in their objectives and system functions. Some focus on result processing, others on result checking, while others address notification or academic record management. Consequently, it is not always clear from the existing literature which communication channels have been combined, how the channels are functionally operated as push mechanism, how authentication and security are handled, what development methodologies are employed, and how the resulting systems are evaluated.

The main knowledge gap addressed by this review is the absence of a consolidated comparative assessment of multi-channel academic result checking and dissemination systems in tertiary institutions. Although individual studies have demonstrated the usefulness of web, SMS, USSD, and other electronic approaches, limited attention has been given to systematically comparing these studies according to their communication channels, functional roles, system architecture, authentication mechanisms, development approaches, evaluation methods, and limitations. In particular, there is a need to distinguish systems that process and compute results from systems that disseminate already-approved results, since these represent different stages of academic result management.

Furthermore, relatively limited attention has been given to the integration of SMS and email as complementary channels within a single result checking/dissemination framework, with SMS/email push notification. This model is important in tertiary institutions where students may have unequal access to internet services and where dependence on a single channel can restrict result accessibility. A systematic comparison of previous studies can therefore reveal which approaches have been adequately explored and which areas require further appraisal.

OBJECTIVES

The study reviews and compares previous research on academic result checking and dissemination in tertiary institutions, with particular emphasis on multi-channel approaches involving web, SMS, email, USSD and related technologies.

The review examines the technologies employed, communication channels supported, relationship between result processing and dissemination, security mechanisms, development methodologies, and evaluation approaches.

The implementation of a Multi-Channel Result Checking System (MCRCS) at the Computer Science Department of Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria provides a practical context for interpreting these findings and

examining how SMS and email can be integrated with an existing Result Processing System. The study cardinally seeks to identify common practices and research opportunities that can guide the development of more accessible, secure and reliable academic result dissemination systems in tertiary institutions.

METHODS

Research Design

This study adopted a structured narrative review and comparative research design to examine previous studies on academic result checking and dissemination systems in tertiary institutions. The approach was selected because the reviewed studies differ in their objectives, technologies, communication channels, authentication mechanisms, and evaluation methods. Rather than developing or experimentally testing a new system as the primary focus, the study examined existing research to identify common approaches and areas requiring further improvement.

The review focused particularly on systems developed that provide students with access to academic results through web, Short Message Service (SMS), Unstructured Supplementary Service Data (USSD), electronic mail (e-mail), Global System for Mobile (GSM), Interactive Voice Response System (IVRS) and combinations of these technologies.

Identification and Selection of Related Studies

Relevant studies were identified from published journal articles, conference papers, institutional repositories, and other scholarly sources relating to academic result management and electronic result dissemination. The search focused on combinations of terms such as student result checking system, academic result management system, online result checking, SMS result checking, USSD result checking, GSM result system, multi-channel result checking/dissemination and academic result notification.

Data Extraction

Information was extracted from each selected study using a structured comparison framework. The following characteristics were considered:

- author(s) and year of publication;
- purpose and scope of the system;
- type of academic result service provided;
- communication or access channel used;
- system architecture and major technologies;
- database and programming technologies;
- authentication and security mechanisms;
- whether the system processed or only disseminated approved results;
- whether the communication mechanism was pull-based or push-based;
- evaluation approach;
- reported advantages and limitations; and
- identified opportunities for further improvement.

This extraction process provided a consistent basis for comparing studies that used different technologies and development approaches.

Comparative Analysis

The selected studies were analyzed comparatively according to their functional and technical characteristics. Particular attention was given to whether a system used a single channel or multiple channels for result access. Web-based systems were examined in relation to their dependence on internet connectivity, while SMS and USSD systems

were considered in terms of mobile accessibility and their suitability for environments with limited internet availability. Email and other communication mechanisms were also considered where they formed part of the result dissemination process.

The analysis also distinguished between pull-based and push-based result access. A pull-based system requires the student to initiate a request and retrieve the result whereas a push-based system sends result information or notifications to the student after the institution has approved and released the results. This distinction was used to determine how different systems provide access and whether multiple communication mechanisms perform complementary functions.

Comparative Evaluation Framework

To provide a meaningful comparison, the reviewed systems were assessed across six major dimensions: accessibility, functionality, security, communication channels, system integration and evaluation.

Accessibility considered whether students required internet access, a mobile network, or a specific device to obtain their results. Functionality examined whether the system supported result processing, result retrieval, notification or a combination of these functions. Security focused on authentication and mechanisms used to restrict unauthorized access to students' academic records.

The communication dimension examined the number and type of channels supported, including web, SMS, USSD, email, GSM, and IVRS. System integration considered whether the proposed solution operated independently or interacted with an existing institutional result-processing system. Finally, the evaluation dimension examined whether the studies assessed functionality, accuracy, usability, response time, reliability, security, or communication delivery.

Identification of Research Gaps

Following the comparative analysis, gaps were identified by examining the limitations and unaddressed areas reported or observed across the reviewed studies. Particular attention was given to studies that depended on a single communication channel, systems that required continuous internet access, limited integration between result-processing and dissemination functions and inadequate consideration of multiple access mechanisms.

The review also examined whether previous studies had clearly differentiated between result processing and result dissemination. This distinction is important because a result processing system computes and approves students' academic results, whereas a multi-channel result checking/dissemination system makes already-approved results available to authorized or certified students.

Case Context: Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria

The review was further interpreted using the development of the Multi-Channel Result Checking System (MCRCS) in the Computer Science Department of Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria, as a practical case context. The case was used to demonstrate how the issues identified in the literature can be addressed through the integration of multiple result access/dissemination channels.

In the MCRCS approach, the existing institutional Result Processing System remains responsible for processing and approving students' results. Approved results are subsequently fed into the MCRCS database for dissemination. SMS and email provide push-based notifications or result information. This practical context was used to relate the findings from previous studies to a multi-channel implementation.

Synthesis of Findings

The synthesis focused on identifying technological trends, areas of agreement and opportunities for improvement.

The resulting comparison provides the basis for determining how multi-channel academic result systems have evolved and what features are required for a more accessible and flexible solution. The methodology therefore provides a systematic basis for comparing previous result-checking approaches and positioning the MCRCS within the existing body of research. The comparative analysis of existing academic result checking and dissemination systems is presented in Table 1.

Table 1: Comparative Analysis of Existing Academic Result Checking and Multi-Channel Result Checking System (MCRCS)

Study	Technology / Platform	Channel (s)	Access Mode	Main Function	Security / Authentication	Major Limitation	Multi-Channel Result Checking System (MCRCS)
Khasnabish (2003)	IVRS / DTMF	IVRS	Pull / enquiry	Result enquiry	-	Limited to voice-based access	-
Adagundo et al. (2009)	SMS-based system	SMS	Pull	Result checking	Password authentication	Single-channel access	-
Awodele et al. (2009)	SMS-based system	SMS	Pull	Result checking	Authentication	Limited channel coverage	-
Kijazi (2016)	SMS Gateway	SMS	Pull / notification	Academic records/result access	-	Dependence on a single mobile channel	-
Famutimi et al. (2015)	C# / MS-SQL / GSM	GSM / SMS	Result checking	Secure result checking	Multifactor authentication	No integrated web and email channels	-
Akinmosin (2014)	Oracle / network-based system	Web / Network	Pull	Result management	-	Dependent on network access	-
Anyiam et al. (2020)	Web-based system	Web	Pull	Result processing and checking	2FA (two-factor authentication) and TOTP (Time-Based One-Time Password)	Primarily web-based access	-
Agushaka et al. (2021)	Web-based examination portal	Web	Pull	Examination/result management	-	Internet-dependent access	-
Ibrahim-Adediji & Ebole (2020)	Web-based hybrid system	Web	Pull	Results and transcript computation	-	Focused on computation rather than multi-channel	-

						disseminati on	
Sahu et al. (2021)	Web-based result system	Web	Pull	Student result management	-	Single primary access channel	-
Badamas i et al. (2023)	USSD / SMS	USSD + SMS	Pull / response	Mobile result checking	-	No integrated web/email access	-
Olaniyan et al. (2025)	SMS-based system	SMS	Push / notificati on	Academic result notification	Security-focused	SMS remains the main delivery channel	-
Present MCRCs	PHP / MySQL / SMS API / Email	SMS +Email	SMS & Email: Push	Dissemination of approved results	Password-based authentication and controlled access	Requires integration, maintenance and dependable communication services	Combines complementary channels while retaining the existing RPS for result processing and approval.

RESULTS AND DISCUSSION

The review of previous studies shows that academic result management and dissemination systems have evolved from conventional notice-board approaches to computer-based and subsequently, mobile-enabled platforms. The reviewed studies generally sought to reduce the time required for students to obtain their results and to improve the efficiency of result-related services. However, considerable differences were observed in the technologies, access channels, security mechanisms and functions supported by the systems.

A major finding of the review is that most existing systems concentrate on a single access channel. Early studies such as Adagunodo et al. (2009) and Awodele et al. (2009) demonstrated the use of SMS as an alternative means of result checking. These systems reduced the need for students to visit notice boards but access remained largely dependent on the mobile channel. Similarly, studies based on USSD and SMS provided mobile access in environments where internet connectivity may be limited. Badamasi et al. (2023) for example, demonstrated the usability of a USSD-SMS interactive result-checking approach for resource-constrained settings.

The review also identified increasing attention to security. Some systems incorporated password authentication, two-factor authentication or other mechanisms for protecting students' academic records. This is important because academic results constitute sensitive institutional information and should only be accessible to authorized users.

Another important finding concerns the distinction between result processing and result dissemination. Some studies combine the computation, storage, processing and checking of results within a single application. Others focus mainly on providing students with access to results that have already been processed by an empowered institutional result-processing system. This distinction is important because a dissemination system does not necessarily need to replace the institution's existing result-processing infrastructure.

The comparative review further shows limited integration of different communication channels within a single result-distribution framework. Web, SMS, USSD and email have mostly been investigated independently or in limited combinations. Consequently, there remains an opportunity for systems that combine complementary channels according to their strengths and limitations.

The reviewed studies demonstrate that different channels support different modes of interaction. SMS and email notification can operate as push mechanisms, where the system sends information to the student after approved results become available.

This distinction provides an important basis for understanding multi-channel result checking/ dissemination system. SMS and email can provide timely notification without requiring students to repeatedly log into the system. Therefore, the channels are not necessarily competing alternatives; they can function as complementary components of the same service as presented in Table 2.

Table 2: Comparative Analysis of Access or Dissemination Channels in MCRCS

Dimension	SMS	Email
Access mode	Push	Push
Internet requirement	Not required	Required
User action	System sends notification	System sends notification
Information capacity	Relatively limited	High
Immediate notification	High	High
Suitable use	Alerts/summary	Detailed notification/result statement

The comparison suggests that a multi-channel approach can reduce dependence on any single communication technology. SMS and email can provide notifications when results are released.

Accessibility emerged as one of the major differences among the reviewed systems. Web-based systems offer convenient access where reliable internet connectivity is available. However, students in locations with poor connectivity may experience difficulties accessing such systems. Mobile-based approaches, particularly SMS and USSD, can provide an alternative because they rely less on conventional internet access.

The findings therefore suggest that accessibility should not be evaluated simply by asking whether a system is online. Rather, it should be considered in relation to the communication infrastructure available to the intended users. A system that provides several access options can accommodate differences in device availability, network conditions and user preferences.

The practical implication is that tertiary institutions can benefit from combining channels instead of relying exclusively on web-based result checking. In a multi-channel arrangement, SMS and email extend the system's reach through notification services.

Security is of particular importance in academic result systems because unauthorized disclosure or alteration of results can have serious academic and administrative consequences. The reviewed literature shows the use of passwords, authentication procedures and, in some cases, stronger authentication mechanisms.

However, security requirements should extend beyond login authentication. A reliable result dissemination system should also ensure correct mapping between students and their results, protect stored records, restrict administrative functions, and maintain appropriate communication logs. The separation of result processing from result dissemination can also provide an additional layer of organisational control because only approved results need to be transferred to the dissemination platform.

In the MCRCS case context, the existing Result Processing System (RPS) remains responsible for processing and approving results. The multi-channel result checking system therefore serves as a dissemination layer rather than replacing the institutional tested result-processing process. This arrangement reduces functional overlap and provides a clearer boundary between result preparation and result access.

The findings of the review informed the practical case of the Multi-Channel Result Checking System (MCRCS). The system adopts two complementary channels: SMS and email. SMS and email function as push mechanisms for notifying students when approved results are available.

The architecture also maintains the existing Result Processing System as the source of approved results. Consequently, the MCRCS does not perform the institutional computation or approval of examination results. Instead, approved results are transferred to the dissemination system for storage, retrieval and communication to students.

This architecture responds directly to the gaps identified in the comparative review. It combines channels rather than depending on one medium, distinguishes retrieval from notification, and separates result processing from result dissemination. It also provides a framework through which authentication, result-to-student mapping and communication records can be managed within the dissemination layer.

Overall, the reviewed studies demonstrate that technology has substantially improved the accessibility of academic results in tertiary institutions. SMS and USSD provide useful alternatives where internet access is constrained. Email provides another channel for delivering notifications and detailed information where internet access is richly available.

However, no single channel completely addresses all accessibility and communication requirements. The findings therefore support a complementary multi-channel model in which different technologies perform distinct functions. In such a model, SMS and email support system conjointly initiated notification.

The principal contribution of the present review is therefore the comparative synthesis of these approaches and the identification of the need for clearer separation between result processing and result dissemination. The MCRCS case demonstrates how this distinction can be translated into a practical architecture in which an existing result-processing platform supplies approved results to a separate multi-channel dissemination system. This provides a basis for improving accessibility while retaining institutional integrity – based control over result processing and approval.

CONCLUSION

This study reviewed and comparatively examined existing approaches to academic result checking and dissemination in tertiary institutions, with emphasis on web, SMS, USSD and email-based systems. The review shows that these technologies have improved access to academic results, but many existing systems depend on a single communication channel and do not clearly distinguish between result processing and result dissemination.

The comparative analysis further shows that web-based access is suitable for detailed, student-initiated result retrieval, whereas SMS and email are useful for system-initiated notifications. Combining these channels can therefore provide complementary access and reduce dependence on a single communication medium. The review also highlights the importance of authentication, accurate student-result mapping, privacy, reliability and proper separation of result processing from dissemination.

The Multi-Channel Result Checking System (MCRCS) provides a practical application of these findings. By retaining the existing Result Processing System as the source of approved results and using SMS and email as dissemination channels, the approach separates result processing from result access.

Overall, the study establishes that a multi-channel approach offers a useful framework for improving the accessibility and timely communication of academic results.

FUTURE WORK

Future research should conduct empirical evaluations of multi-channel result checking/dissemination systems across several tertiary institutions and larger student populations. Such studies should use common evaluation measures covering usability, accessibility, security, response time, reliability, delivery success and user satisfaction.

Further work could also investigate the integration of USSD and mobile applications with web, SMS and email to provide additional access options, particularly in environments with limited or inconsistent internet connectivity. Security could be strengthened through multi-factor authentication, encryption, audit trails and more robust access-control mechanisms.

Another area for future research is the development of interoperable interfaces between institutional Result Processing Systems and dedicated dissemination platforms. Such integration could reduce duplication of functions while ensuring that only approved results are made available to students.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the Tertiary Education Trust Fund (TETFund) Nigeria, for the financial support provided towards the successful execution of the research projects titled “Academic Result Checking and Dissemination in Tertiary Institutions: A Comparative Review of Existing Approaches”

The authors also express their sincere appreciation to the Management of Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria for providing the institutional support and enabling environment necessary for the successful execution of the project.

The authors remain grateful to TETFund for its continued commitment to strengthening research, innovation and technological development in Nigeria's tertiary education sector.

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