# DESIGNING AND IMPLEMENTING AN AUTOMATED INFORMATION SYSTEM FOR PRESCHOOL EDUCATIONAL INSTITUTIONS

***Nazirjonova Nargizaxon Sobirovna*** [1]
***Adambayev Uchqunbek Erkinovich*** [2]
[1]*National University of Uzbekistan named after Mirzo Ulugbek, 2nd stage master's student.*
[2]*National University of Uzbekistan named after Mirzo Ulugbek · Department of Algorithms and programs technologies, Candidate of Science*

**ABSTRACT:** This article explores the design and implementation of an Automated Information System (AIS) tailored specifically for preschool educational institutions. It addresses the growing need for streamlined data management, efficient communication, and improved operational processes in early childhood education settings. Using a comprehensive literature review, theoretical foundations, and practical application, the study presents a step-by-step methodology for developing an AIS. The results from pilot implementation in selected preschools reveal significant improvements in administrative efficiency, data accuracy, and stakeholder satisfaction.

**KEY WORDS:** Automated Information System, Preschool Education, Data Management, Educational Technology, System Design

## INTRODUCTION:

The rapid advancement of information and communication technologies (ICT) has reshaped society, fostering the development of an information-based economy and governance structures. In Uzbekistan, the growing integration of ICTs has prompted reforms across various domains, including education. Concepts such as e-learning, e-governance, and electronic resource management have become essential for improving educational access and quality.

Preschool education, a critical phase in a child's development, demands efficient management of resources and transparent communication among administrators, educators, and parents. The introduction of AIS into preschool institutions addresses these needs, providing a centralized platform for data management, process automation, and real-time interaction.

The relevance of this study is underpinned by recent government initiatives aimed at improving preschool education. For example, Uzbekistan's Presidential Decree No. PQ-2707 in 2017 emphasized modernizing the preschool education system and integrating digital solutions for enhanced management and quality assurance [1]. Despite these efforts, many institutions still rely on manual processes, resulting in inefficiencies and limited transparency.

Preschools are foundational educational settings where children develop their initial cognitive, social, and emotional skills. Efficient management of these institutions is critical, yet they often face challenges such as handling enrollment, attendance tracking, and communication with parents. Manual processes, still prevalent in many preschools, are time-consuming and prone to errors.

Automation offers a solution, transforming traditional administrative workflows into efficient and error-free processes. While AIS solutions are common in higher education, the unique requirements of preschools such as user simplicity and parent-teacher communication demand a specialized approach [2].

## Objectives

This study aims to design and implement an AIS that meets the operational needs of preschools. The objectives include:

1. Automating core administrative functions such as admissions, attendance, and reporting.
2. Ensuring secure data management and easy access for authorized stakeholders.
3. Enhancing parent-teacher communication.
4. Creating a scalable, user-friendly system suitable for diverse preschool environments.

## LITERATURE REVIEW:

### Automation in Education

Technological integration in education has evolved significantly, with AIS systems playing a crucial role in streamlining operations. Higher education institutions have successfully adopted AIS for tasks like student registration and performance tracking. However, limited studies focus on AIS implementation in early childhood education [3].

### Theoretical Framework

The **Unified Theory of Acceptance and Use of Technology (UTAUT)** serves as the study's theoretical foundation. It emphasizes the role of perceived usefulness, ease of use, and social influence in technology adoption [4]. These factors are particularly relevant for preschools, where staff and parents often lack technical expertise.

### Existing Systems and Gaps

Current AIS models cater primarily to large-scale educational institutions. Preschool requirements, such as simplified interfaces and features tailored for young children’s records, are often overlooked [5]. These gaps highlight the need for a customized solution.

### Challenges in Preschool Management

Preschools face unique operational challenges, including:

- Maintaining accurate attendance records.

- Communicating effectively with parents regarding schedules and updates.
- Adapting to fluctuating enrollment numbers.
- Protecting sensitive data, such as health and emergency contact information[6].

## DISCUSSION:

### System Requirements

The design of the AIS was based on comprehensive stakeholder consultations, including preschool administrators, teachers, and parents. The system's requirements included:

- **Functional Features:**
  - Admission and enrollment automation.
  - Attendance tracking with real-time updates.
  - Communication tools for parents and staff.
  - Report generation for student progress and institution performance.
- **Non-Functional Features:**
  - Scalability for institutions of varying sizes.
  - High-security standards to protect sensitive data.
  - A user-friendly interface accessible on multiple devices.

### Methodology for System Design

The development process followed an **Agile approach**, ensuring continuous feedback from end-users. Key steps included:

1. **Requirement Gathering:** Interviews and surveys with preschool staff and parents.
2. **System Architecture Design:** Three-tier architecture comprising the user interface, application logic, and database layers.
3. **Development Tools:**
   - **Frontend:** React.js for a responsive user interface.
   - **Backend:** Python (Django framework) for robust functionality.
   - **Database:** MySQL for structured data storage.
4. **Prototype Development:** Iterative prototyping to refine features based on user feedback.

## DISCUSSION:

### Pilot Implementation

The AIS was implemented in three pilot preschool institutions over six months to evaluate its effectiveness. These institutions were selected based on varying enrollment sizes (50–200 students) and operational challenges[7].

### Implementation Phases:

1. **Initial Setup:** Installation of the AIS and migration of existing records.

2. **Training:** Staff and parent workshops to familiarize users with the system.
3. **Testing:** Live testing of attendance tracking, report generation, and communication features.

**User Feedback:**

- **Administrators:** Reported reduced workload and improved accuracy in record-keeping.
- **Teachers:** Found attendance automation particularly beneficial, saving 30–40 minutes daily.
- **Parents:** Appreciated real-time updates on attendance and announcements.

**RESULTS:**

**Efficiency Improvements**

Quantitative metrics were collected during the pilot phase to measure the AIS's impact:

| Metric | Manual System (Pre-Implementation) | AIS (Post-Implementation) | Improvement (%) |
|---|---|---|---|
| Time for student enrollment | 2–3 hours | 15 minutes | 75% |
| Attendance tracking accuracy | 70% | 98% | 28% |
| Parent communication response | Delayed (1–2 days) | Real-time updates | 100% |

**Cost-Benefit Analysis**

While the AIS required an initial investment in hardware, software, and training, the cost savings from reduced paperwork and administrative time were significant. It is estimated that institutions could recover their investment within 12–18 months.

**DISCUSSION OF CHALLENGES:**

**Resistance to Change**

Some staff members, particularly those less familiar with technology, expressed hesitation in adopting the new system. This was addressed by:

- Conducting personalized training sessions.
- Providing a dedicated support team during the initial implementation phase.

**Data Migration**

Integrating existing manual records into the AIS proved challenging due to inconsistencies in the data. A custom data-cleaning tool was developed to standardize records before migration.

**Scalability**

Although the system was scalable for larger institutions, smaller preschools with limited budgets needed a cost-effective solution. To address this, an open-source version with basic functionalities was introduced[8].

## CONCLUSION:

The design and implementation of an AIS tailored for preschool institutions demonstrated significant improvements in efficiency, accuracy, and stakeholder satisfaction. By automating administrative tasks and enhancing communication, the system addressed core challenges faced by preschools.

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