# A Proposed Artificial Intelligence-Based System for Developing E-management Skills in Saudi Primary Schools

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## Abstract

This study aims to investigate the impact of Artificial intelligence-driven solutions on school leaders' proficiencies. Leaders have the responsibility of making decisions in educational institutions as well as carrying out routine tasks daily. Artificial intelligence-assisted applications have noteworthy contributions to the field of educational management. The scope of this study is limited to selected features; data analytics, chatbot, and e-survey. The basic design of this study started with analyzing literature in this domain. This was followed by designing a system consisting of four models: building a dashboard, predicting students' results, creating a chatbot for responding to parents' queries and creating an e-survey for measuring staff satisfaction. The participants of this study consist of 35 school leaders, whereas the sample was one group that was exposed to special treatment. A pre/post-test was conducted to examine the impact of the treatment, in addition to an observation card that was used to measure the treatment's impact on the technical domains. The researchers used SPSS to analyze the study's results.

The prominent finding of this study is the significant impact of Artificial intelligence on leaders' competencies; the difference between mean scores in both pre and post-test application and post-application for the observation card has proven the positive impact of the proposed treatment.

**Keywords:** Artificial intelligence, machine learning, data analytics, chatbot, e-survey, e-management skills

## 1.    Introduction:

Educational management is the process through which school leaders arrange and manage the available resources aiming at achieving the educational system's goals and vision (Amadi,2008). Nevertheless, the role of school administration has changed rapidly over the last few years, it is no longer limited to the usual routine and adhering to the instructions of the school system, but it went beyond these responsibilities to revolve around the students and providing what it needs to boost their growth beside taking several responsibilities considering teachers' performance and elevating it to improve the educational process as a whole (Atwi & Ezzat, 2001; Markow et al,2013).

In terms of educational management, decision-making is one of the most fundamental activities school managements engage daily. Consequently, the decision manners of leaders are means for the effective management of the school.  In this respect, a school's success critically depends on effective decisions (Lunenburg, 2010; Ugurlu, C.T,2013) Thus, school leaders are always in charge of making effective decisions in each situation that may require choosing from alternatives or even predicting the future. (Amalia et al, 2019)

Because decision-making is so critical and can significantly affect the development of a school, it has been suggested that administration is a decision-making process (Johnson & Krus,2012). Such a process of decision-making that impact the educational system is significantly influenced by leaders' proficiencies who are expected to be well-trained. (Obied, 2020) Therefore, school leaders are requested to educate themselves and develop their managerial skills to keep pace with the accelerating technological advancement (Massud & Khalifa,2008; Tyson, 2020).

School leaders found themselves forced to think seriously in a complete or gradual transition to advanced digital tools, seeking to eliminate traditional management and shift toward the so-called electronic management (Amalia, 2019). In this line, Kingdom of Saudi Arabia vision 2030 emphasizes the urgent need to invest in new technologies in school, so that administrators and school leaders are forced to switch to modern technology in their usual practices. (Obied, T. 2020)

The digital transformation in school administration is a modern trend that provides feasible solutions for institutions encountering insufficiency in the conventional approach, meets school needs, and achieves higher and easier capabilities, saving energy, cost, and time. Furthermore, e-management aims at exchanging experiences and information, providing services at high speed and low price, and elevating the performance of educational management structures in each stage; planning, organizing, implementing, supervision and evaluation (Aldalalah et al.,2015).

Artificial intelligence is a worthy candidate that has shifted the paradigm in the whole educational sector via providing a plethora of solutions that support school managerial system as well as the teaching and learning process (Ahmad, K,et al, 2020). Some of the main AI-assisted applications in the field of education are students' admission, personalizing learning, grading systems, learning analytics, virtual reality; such tedious tasks can be effectively accomplished by AI-based features (Ahmad, et al,. 2022).

In the educational sector, data analytics is urgently needed at diverse levels such as classes, department, schools, regional, local, and international levels; in each level, available abondance of data can be invested in order to empower the learning environment (Ahmad, S.F,et al 2022). Data mining enables an in-depth understanding for the school settings and students as well as extracting new knowledge through predictive models which support the leaders in decision-making and drawing meaningful insights (CHEN et al, 2020).

Karsenti, (2019) stated that Artificial Intelligence-based solutions offer interactive facilities among school stakeholders such as chatterbot which is able to recognize users' language then simulate human-like conversation. In addition, AI-software plays an essential role in collecting information, storing it in a secure path, then analyzing and extracting knowledge.

Generally, Artificial Intelligence provides school leaders with both administrative and ethical support.

## 2. Statement of the problem:

Increased accountability puts pressure on school leaders and administrators. Whilst an administrator has the responsibility to analyze data to make decisions in a school, there is an urgently need for reviewing data and metrics as well as using that data and applying it to develop clear strategies which used to improve school outcomes (Nguyen et al., 2020).

Ajuzieneogu,2019; Chassignol, 2019 stated some functions of AI that can be utilized in a school administration, such as; automation, machine learning, deep learning, and natural language processing. Generally, the human-like intelligence approach is a pivotal driver of accelerated

advancement because it promotes accurate, evidence-based, and fast decisions (Shrestha, 2019).

For example, Artificial Intelligence can analyze data to extract meaningful insights essential for making critical decisions (Shrestha, 2019), According to, Mader &L.Hilty, (2008); Ahmad, K,et al,( 2020); Vanthienen, J., & De Witte, K. (Eds.). (2017), by using machine learning algorithms used for making data-driven decisions, the educational administration can draw rational and cost-effective plans, mentoring, and evaluate educational outcomes. AI assists administrators with big data to boost visualized and predictive analytics that consume human-intensive effort and time (Hussain, M., & Manhas, J. (2016). There are four levels of data analytics: Descriptive analytics, Diagnostic analytics, Predictive analytics, and Perspective analytics (Ahmad, K,et al, (2020); Król, K., & Zdonek, D. (2020).  Generally, Data mining systems are already playing a quintessential role in today's education (Ajuzieneogu,2019).

Regarding the researcher's experience, previous studies, and conference recommendations, the researcher suggests an Artificial intelligence-based system for improving and enhancing management skills.
The researcher conducted an exploratory study on a sample of (10) school leaders in primary schools in the Riyadh educational area, and the study found that (100%) of the study sample suffer from difficulties in achieving their tasks and that (70%) find that the decision-making is one of the most difficulties they face in managing their schools, and (90%) of the study sample confirmed their need for developing their e-management skills

### 3.     Research Questions:

The problem of the research tackled the following major question:

What is the proposed Artificial Intelligence-based system for developing e-management skills in Saudi primary schools?

To answer the previous main question, the following subsidiary questions should be answered:

1- What management skills the artificial intelligence-based system can develop?
2- What is the proposed design of the artificial intelligence-based system that can develop e-management skills?
3- What is the impact of using the proposed Artificial intelligence-based system on developing e-management skills among Saudi school leaders?

### 4.     Research Hypothesis:

1. There is a statistically significant difference at the level of (0.05) in the total mean scores of E-management skills achievement skills in the pre-test and post-test in favor of post-test.

2. There is a statistically significant impact at (a ≤ 0.05) in the total mean scores of the observation cards due to using the proposed artificial intelligence-based system.

## 5.     Research Objectives
The research aims at achieving the following objectives:
1. Identifying the e-management skills that the Artificial Intelligence-based system an develop.
2. Designing an Artificial Intelligence-based system for developing e-management skills in Saudi primary schools.
3. Identifying the impact of using the proposed Artificial Intelligence-based system  on developing E-management skills in Saudi primary schools.

## 6.      Research significance:
The present research is optimistically expected to help:

1- elevate school leaders' proficiency and foster their e-management skills by directing their attention toward AI-based solutions.

2- detect innovative solutions that boost data-driven decision-making in school managemen

3- guide school leaders to draw meaningful insights by forecasting the future.

4- shed light on the modern way of communication among school stakeholders.

5- detect new approaches to sharing experiences among team members in schools.

6- pave the way to further studies and research related to the topic.

## 7.     Literature Review:
Haenlein M., & Kaplan, A. (2019) stated that **Artificial Intelligence** is a computer that can learn from processing data, solve problems, and carry out complicated tasks adaptively.

**Machine learning** is one of the AI sub-approaches that does  not follow a specific set of rules, however, it can predict and make decisions by learning from stored data (Baker,T. et al, 2019

**An Artificial Neural Network** (ANN) is a part of machine learning which refers to computing systems that mimic human brain structure in translating, interpreting, and creating text. (Duggan,2020).

**Deep learning** is another sub-approach of machine learning that uses Deep Neural Networks (DNN) for machine learning tasks. Deep learning can be used for significant tasks of AI, such as in Natural Language Processing, speech recognition, and computer vision (Holmes et al., 2021).
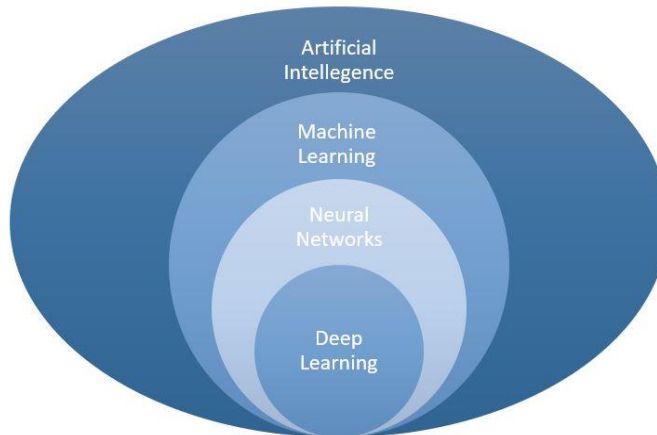
**Figure 1.***The relationship between Artificial Intelligence, Machine Learning, Neural Network, and Deep Learning (Goksel & Bozkurt, 2019)*

### Some AI-driven applications that empower educational management:

- **Data Analytics:**
  **-**Visualizing data highlights critical information and fosters decision-making. To illustrate, it enables school leaders to monitor learners' activities and view students' interactivities. Such visual statistics provide the monitor with meaningful insight that enhances decision-making (Nguyen et al., 2020; Ahmad, S.F,et al.,2022 .
  -Prediction is another form of data analytics. Hence educational institutions are always keen to know how their students pass/fail exams, some AI algorithms are applied in this field (Imran et al., 2019).

- **Conversational chatbot:** A chatbot stimulates a human conversation with a natural language in real-time. chatterbot can be customized based upon users' personalities and needs (Owoc et al.,2021).

- **Automating daily activities:** Using AI features, school administrators accomplish burden tasks such as allocating academic courses, setting timetables, maintaining learners' attendance, messaging for all concerned, staff leave, and foster management (Owoc et al.,2021).

- **Grading Systems:** AI technologies provide precise models for predicting student behavior and academic performance. Automated grading mimics the teacher's behavior of assigning grades to the answer sheets submitted by the students. It facilitates evaluating their progress by processing and analyzing their answers, giving feedback, and recommending personalized teaching plans (Bhila, & Maseru, 2018; Ahmad, K et al., 2020).

- **An expert system:** Expert systems is one AI-driven solution that aims at creating data, process data, make decisions, and solve problems. It permits the user to use the available information, helps distribute human

experience, and provides an environment to query and find answers (Supriyanto et al., 2018).

- **Humanoid robots:** They can play a significant role in assisting teachers in time-consuming tasks (Goksel & Bozkur, 2019; Karsent, 2019; Kengam, 2020).
- **Recommendation Systems:** AI enables strengths in the recommendation domain because it enhances achieving remedial actions according to the rubric line. Thus, multi-label classification algorithms are then used to do proper steps according to learners' performance per group of students (Ahmad et al., 2020).
- **Anti-cheating systems.** Anti-cheating software enables achieving integrity and privacy for exam takers (Ahmad et al., 2020).
- **Sentiment Analysis in Education**: An AI tool improves learning by analyzing opinions and learners' facial expressions to understand emotions and attitudes (Ahmad et al., 2020).
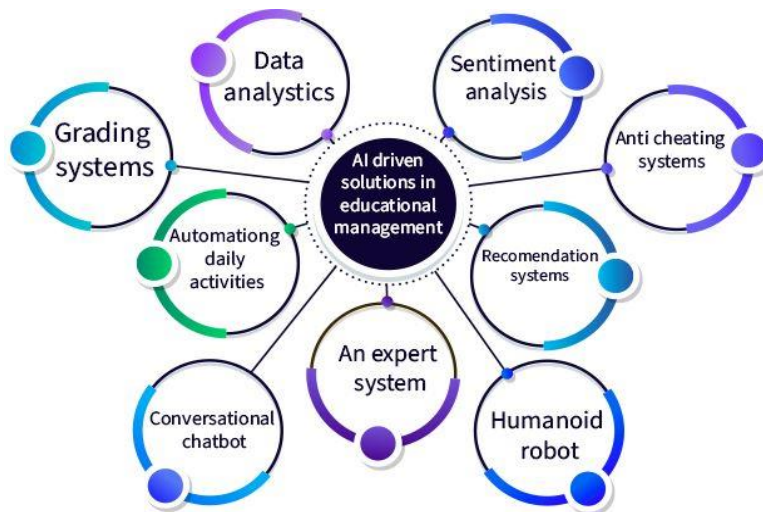


**Figure** 2**.** *AI-driven solutions in the educational management (developed by the researchers)*

**Data Analytics**

Madhu et al,. (2019) defined data analysis as shifting and remodeling data to reach meaningful conclusions that lead to decision-making. Data Analytics aims to draw conclusions from available information and drive decisions based on the analysis.

According to Ashirwadam, 2014; Baker, & Inventado 2014 ; Bakhshinategh et al,. 2014; There are two types of data; Qualitative data and quantitative data. Qualitative Data is not easily expressed in numbers. It is

represented in narrative language descriptions such as words, images, videos, audio, graphics, and visuals. It tends to make meaning from data sources interpreted differently. While, quantitative data expresses factual data involving numbers or categories in numerical terms, whether values are large or small.

### Applications of data analytics in education

De Smedt et al. (2017) stated three domains for investing data in education:

- **Data analytics to improve the learning process:**
  Data analysis is practical when using immediate feedback in the learning process through mining and predicting students' performance; instructors can use it to obtain insights into students' behavior and act accordingly in real time.
- **Data analytics to measure performance:**
  In this type, Data Analytics focuses on the scope of the student's academic achievement related to interactivities with the teacher's activities.
- **Policy relevance and the challenges ahead:**
  Evidence-based education is an emerging philosophy that means education should be based on the best evidence about what works.

### Data Analytics Levels:
### Data Visualization:

Computational software enables presenting data in visual graphs and drawing to provide the user with a dynamic tool that permits the smooth handling of data and analyzing it. Hence visualization refers to transforming information into attractive patterns and straightforward models; it effectively enables exploring a heterogeneous and dynamic database from complex systems. (Migrant &Seasonal Head Start, 2006; Johnson et al., 2010; Bikakis, 2018)

- **Descriptive analytics:** provides an answer to the question "What happened in the past? In other words, collecting and visualizing historical information.
- **Diagnostic analytics:** answer the question "Why did it happen"? Identifies models and dependencies in available information. It is often an alternative to traditional analysis. Such a level of data analytics enhances monitoring and controlling.
- **Predictive strategy** involves modeling and preparing simulations and forecasts. With this approach, machine learning algorithms process significant data volumes.

- **Prescriptive analytics** uses simulating forecasts and machine learning to recommend actions to be done to achieve target outcomes (Riahi, Y., & Riahi, 2018; Król, & Zdenek , 2020).

## Chatbot

A chatbot (or conversational agent) is a software feature capable of interacting with humans through text or verbal speech. Thus, these conversational agents can provide the user with information, answer queries, discuss a specific domain, or accomplish a required task. Recently, the chatbot has been used for many purposes across different fields, such as customer service, marketing, technical support, and education and training. (Smutny& Schreiberova, 2020) The chatbot programs initially aimed to comprehend and generate natural conversations that entertain the user; afterward, advanced chatbots have been created primarily to assist with tasks (Chantarotwong, 2006).

## Applications of chatbots in educational management:

- **Optimizing administrative and service tasks:** Chatbots enhance some administrative functions to increase productivity and save the burden time that administrators spend daily. (Farkash, Z., 2018; Hien et al., 2018).
- **Frequently Asked Questions - Chatbots:** These informational features are widely used in different educational fields**.** FAQ chatbots empower users to find answers to their frequent questions on behave of administrators or academic representatives. s (Ranoliya et al,. 2017; Roos,2018; Hristova, 2019; Abdelhamid & Katz, 2020).
- **Recruitment Chatbots:** Bots can boost the recruitment process by conducting preliminary interviews with candidates and job nominations to analyze job seekers' data. (Hristova,2019) An AI-based chatbot can collect applicants' experience, build relationships, filtrate nominees, and schedule meetings (Nawaz & Gomes,2019).
- **Staff training:**   Chatters can guide trainees step by step. These conversational tools minimize the tasks assigned for the teacher and adapt to the individual needs of trainees. Furthermore, chatbots empower maintaining knowledge when the learner can access course materials more than once (Hien et, al,.  2018; Naggar & Habeb, 2021).
- **Question-Answer Systems:** QA chatbots effectively enable learners to identify the appropriate track by parsing learners' profiles and interacting with them to evaluate them. This type of chatbot can analyze the text and find a proper response. Its methodology is based on abstracting a group of keywords from natural language question; after that comes the module of document processing in which the chatbot retrieve the whole document

from the information corpus. Then, the chatbot algorithms match the question with the appropriate answer passage. (Elnozahy, et al,.2019)

- **Staff appraisal:** One of a manager's professions is evaluating staff's performance. Hence, chatbots can perceive the institution's vision and goals; then, chatterbots are beneficial for delivering immediate feedback and processing results. **(**Hristova,2019).
- **Students' Evaluation and Feedback:** A chatbot can compare students' progress with the input goals. Such immediate feedback helps the student evaluate if his engagement is sufficient to achieve his goals or if a change should be there. (Nicol& Macfarlane-Dick, 2006)

## Online Survey

The survey is one practical tool for collecting data to measure a large community's opinions, behavior, or attitudes. In other words, a survey is a technique of obtaining information from a large community using a representative sample inferred from the whole community (Vehovar & Manfreda, 2008).

## Applications of E-surveys in education:

For meaningful insights, decision-makers need data on tendencies, opinions, and facts in their institutions or community to make effective decisions. since surveys are an effective tool to collect surveillance data. Weinstock & Meyers 2016; KRISTJANSSON et al,. 2013 mentioned some domains that a school can use surveys to measure:

- Effectiveness leadership: School policymakers can use surveys to measure the principal's ability to create the school's vision and mission and provide clear guidance for school instruction as one key factor for school performance.
- Strong curriculum: one factor of school performance that surveys measure is academic goals and classroom levels.
- Professional development: Teachers' training is one factor that e survey can measure.
- School culture**:** a survey can measure parental involvement in school activities.

## 7. Methodology:

- Design of the study

The present research adopts the quasi-experimental approach to test the hypotheses and measure the impact of the proposed system on developing e-management skills.

**Table 1.** Quasi-experimental design of the research

| Groups | Pre-application | Treatment | Post applications |
|---|---|---|---|
| The experimental group | - Achievement test for the cognitive aspects of e-management skills. | Using the proposed Artificial Intelligence-based system | - Achievement test for the cognitive aspects of problem-solving skills in Science<br>- Observation card for measuring the technical domain |

- **Variables:**
  The present study tackles two variables:
  1- Independent variable: Artificial intelligence-based system
  2- Dependent variable: E-management skills

- **Participants:**
  The population of this study was school leaders and administrators with different responsibilities in primary schools. Therefore, the sample of the current study was chosen randomly at Al-Tarbya Al-Eslameya primary schools in Riyadh. The study's participants were 35 school leaders who were classified based on their experience.

**Table 2.** *Demographic distribution for the sample*

| Factor | Category | No. | percentage |
|---|---|---|---|
| Gender | Male | 6 | **18 %** |
|  | Female | 29 | **82 %** |
| Experience | 0 to 5 years | 12 | **34.2%** |
|  | 6 to 10 years | 11 | **31.4%** |
|  | 11 or more | 12 | **34.2%** |

- **Data Collection Tools:**
  1- **A list of e-management skills:** the researcher investigated and analyzed prior studies that tackled e-management skills and set a matrix that shows the frequency of the skills. Next, the researcher set a list of the e-management skills that the Artificial Intelligence-based System can develop. The list was presented to eight jury members who suggested some modifications. Finally, the researcher modified the list considering their comments.

- **Measurement Tools:**
1- **Pre/post-test:** The researcher conducted a pre/post-test to investigate the impact of the proposed artificial intelligence-based system on developing e-

management skills. The test was presented to five jury members who suggested modifications the researcher considered.

**2- Observation cards:** The researcher conducted an observation card to measure the improvement in technical skills. The observation card was presented to five jury members who suggested modifications the researcher considered.

- **Developing the system:**

The researchers identified WordPress for building the system (website); such a website contained four AI-driven solutions (Visualization tool, prediction tool, e-survey, and chatbot) that enabled the participants to level up their e-management skills. The system is supported with some models, tutorials, resources, and activities that help the users to use it effectively.

The researchers identify the software used to achieve the target goals as follows:

**Table 3.** *Implementing AI-driven solutions in the proposed system. (Developed by the researchers)*

| Available AI solutions | Software | Project achieved |
|---|---|---|
| **Visualization** | Microsoft Power BI | - dashboard for annual administrative report |
| **Prediction** | Orange for datamining | 1- building a model for predicting students' results (passed/failed)<br>2- building model 2 for investigating key influencers for students' results |
| **Chatbot** | WB bot | - building a chatterbot for answering parents' queries |
| **E-survey** | SurveyMonkey | - Creating an e-survey to investigate staff satisfaction |
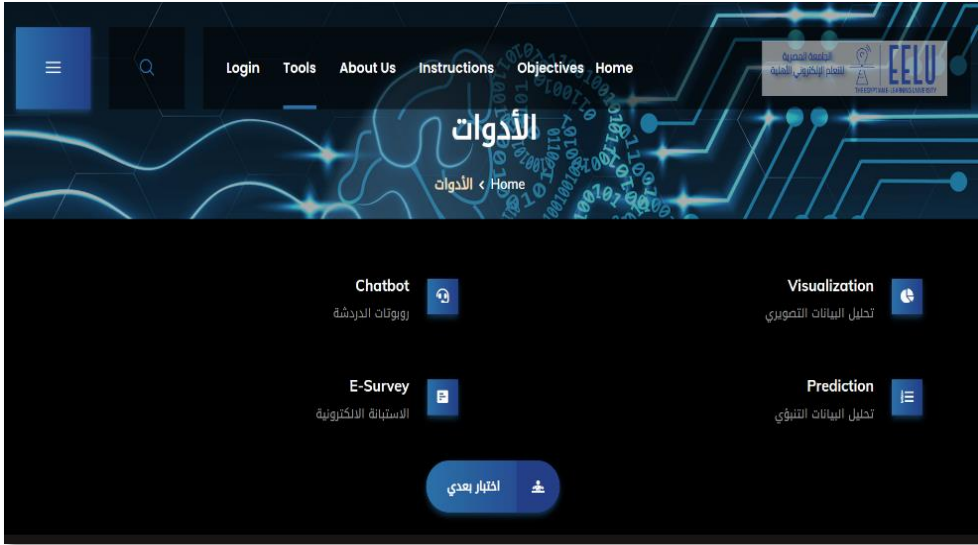
**Figure 3.** *The available AI-based tools implemented in the proposed system*
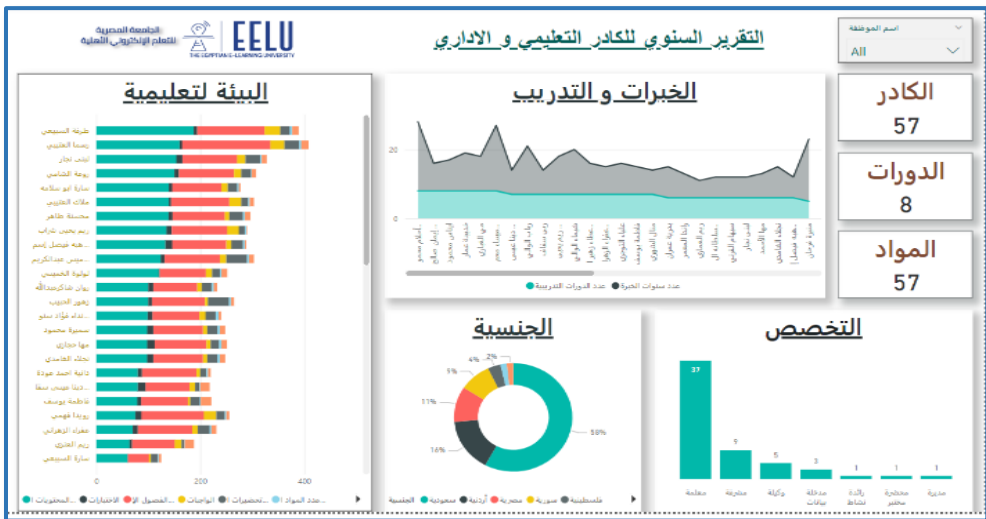*(Designed by the researchers)*



**Figure 4** *Model (1) Descriptive analytics; annual administrative dashboard*
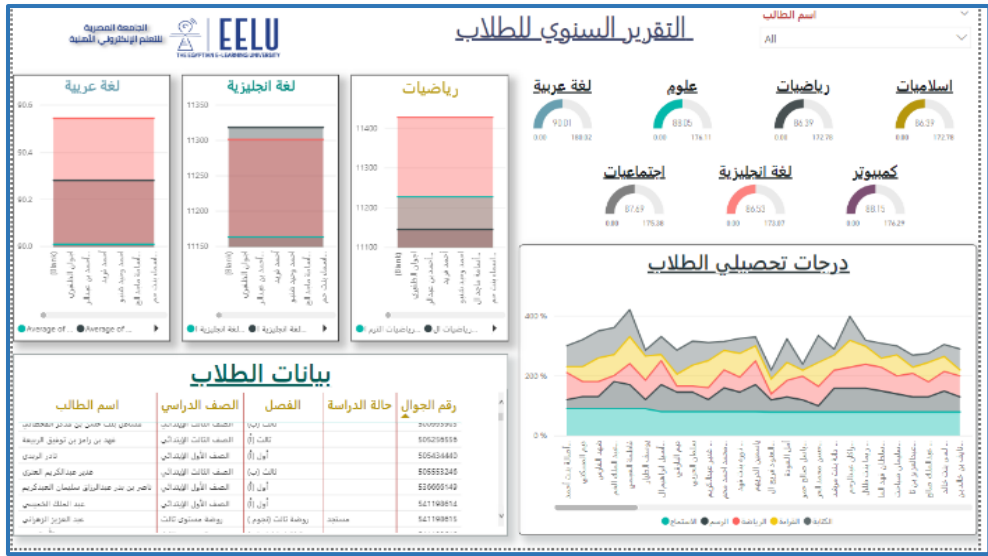*(The model was designed by the researchers)*

**Figure 5.** *Model (2) Descriptive analytics; annual administrative dashboard*
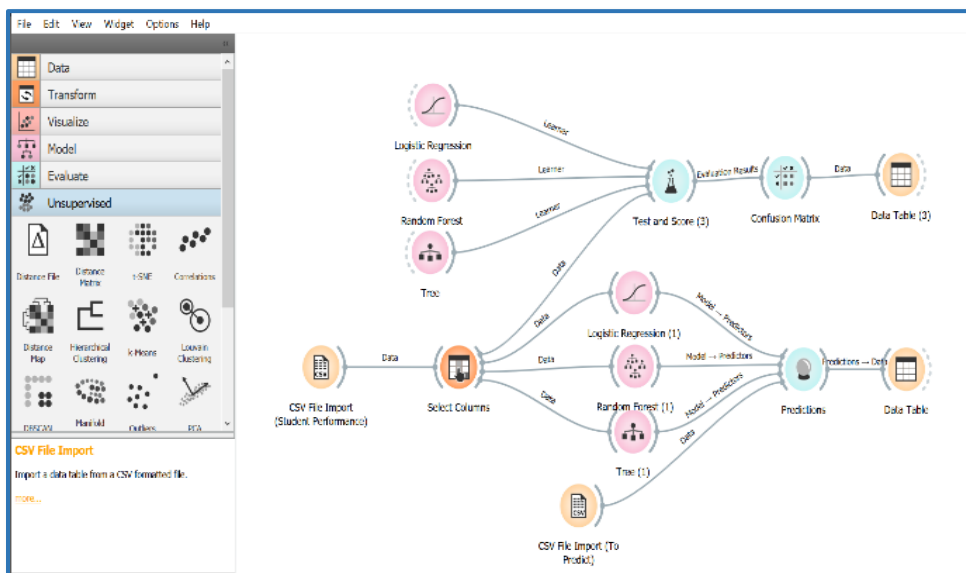*(The model was designed by the researchers)*



**Figure 6.** *Predictive analytics;  prediction for students' performance  in coming exams*
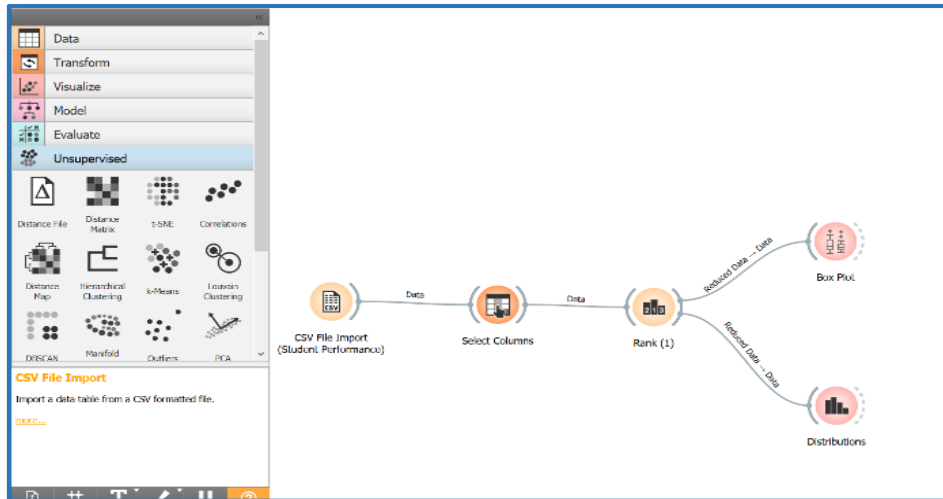*(The model was created by the researchers)*

**Figure 7.** *Predictive analytics; investigating the key influencers on students' performance. (The model was created by the researchers)*
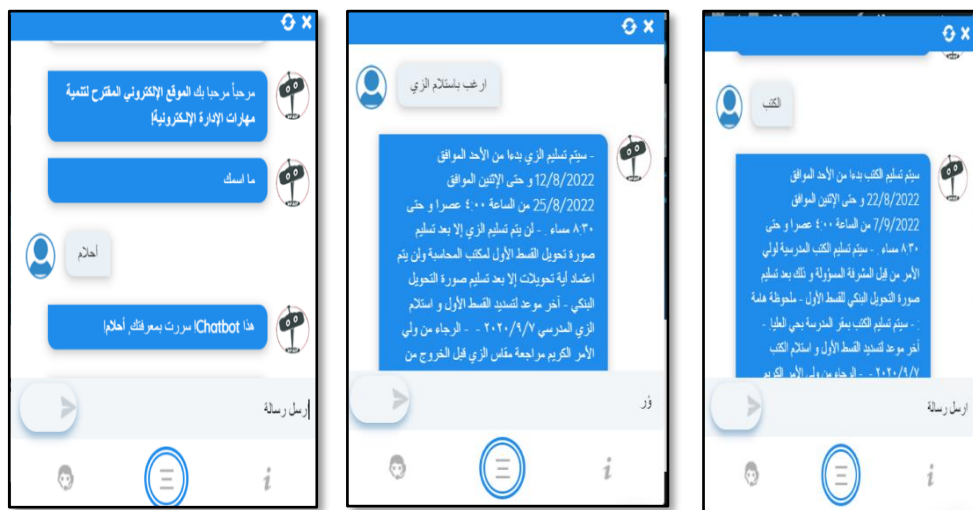


**Figure 8.** *Chatbot for administrative purposes ;answering parents' queries (The chatbot was created by the researchers)*

**Figure 9.** *Building an e-survey; measuring staff satisfaction*
*(The survey was created by the researchers)*

- **Procedures:**
  The researcher relies on the following procedures:

1- Analyzing prior studies and research related to e-management skills in schools.
2- Conducting a list of e-management skills, presenting it to experts and arbitrators in the field, then making the suggested modifications.
3- Conducting an achievement test for the cognitive domains of e-management skills, presenting it to experts and arbitrators in the field, and adjusting.
4- Building an observation card for the technical aspects of problem-solving skills, presenting it to experts and arbitrators in the field, and making adjustments.
5- Building an evaluation card for the proposed system with four AI-assissed tools.
6- The exploratory application of research tools to verify their stability.
7- Choosing the primary research sample randomly from the primary schools leaders.
8- Pre-application of the achievement test on the participants.
9- Applying the empirical research group using the proposed Artificial Intelligence based System.
10- Post -application of the achievement test and the observation card.
11- Data collection, analysis, and statistical processing.
12- Interpretation of the results.

## 8. Data Analysis :

The researchers used the Statistical Package for Social Sciences (SPSS) Version (21) to analyze the study results by applying the following:

1- A Paired-Samples t-test to calculate the difference in the mean scores for the pre-and post-applications of the e-management skills test.

2. Effect size to examine the effect of the independent variable (Artificial Intelligence-based system) on the dependent variables (E-management skills). Therefore, the effect factor was extracted using Eta2 via (t) value resulting from the difference in mean scores of e-management skills

## 9. Results:

- The first hypothesis:

**Table 4.** *Results of paired sample t-test to verify the differences between mean scores of E-Management skills achievement test in pre and post application*

| Skill | Application | Mean | Std. Deviation | Earning | | t | df | Sig. | h 2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | Mean | Std. Deviation | | | | |
| E-change to digital transformation | Pre | 3.11 | 1.301 | 1.886 | 1.409 | 7.915 | 34 | 0.000 | 0.648 |
| | Post | 5.00 | 1.000 | | | | | | |
| Technical skills | Pre | 1.91 | 1.197 | 1.771 | 1.165 | 8.993 | 34 | 0.000 | 0.704 |
| | Post | 3.69 | 0.631 | | | | | | |
| E-building skills | Pre | 1.94 | 0.968 | 1.400 | 1.288 | 6.431 | 34 | 0.000 | 0.549 |
| | Post | 3.34 | 0.765 | | | | | | |
| E-social skills | Pre | 2.14 | 1.089 | 1.171 | 1.071 | 6.473 | 34 | 0.000 | 0.552 |
| | Post | 3.31 | 0.530 | | | | | | |
| E planning & E organizational skills | Pre | 3.00 | 1.029 | 1.429 | 1.313 | 6.439 | 34 | 0.000 | 0.549 |
| | Post | 4.43 | 1.065 | | | | | | |
| Total Score | Pre | 12.11 | 2.958 | 7.657 | 3.143 | 14.41 | 34 | 0.000 | 0.859 |
| | Post | 19.77 | 2.451 | | | | | | |
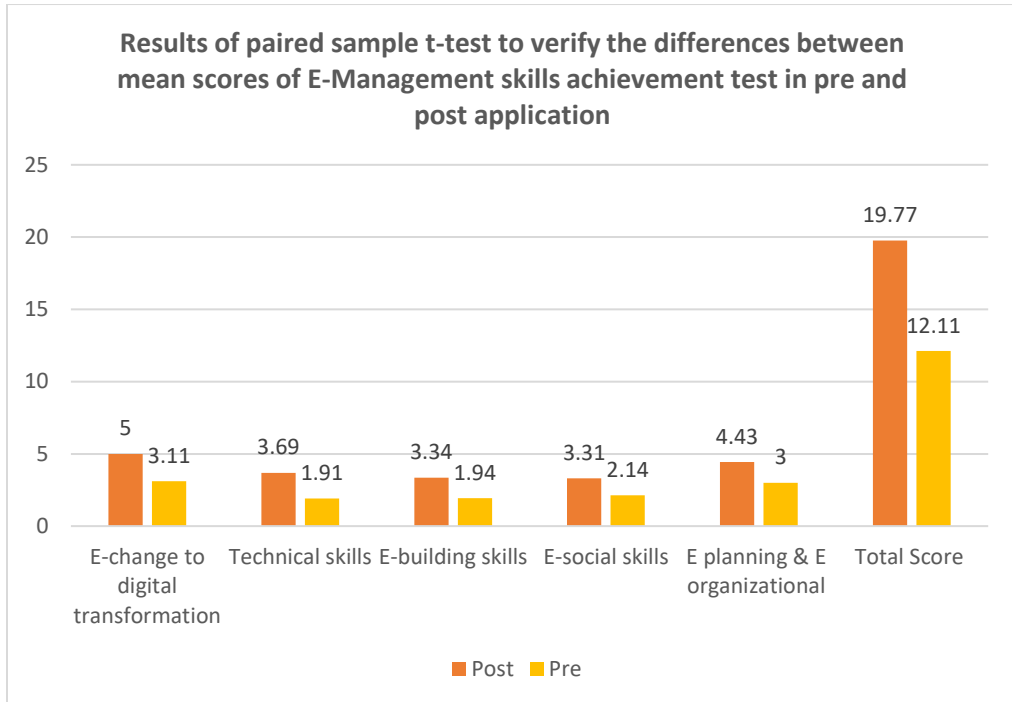
**Figure 10.** *Results of paired sample t-test to verify the differences between mean scores of E-Management skills achievement test in pre and post-application*

The mean score of "Total E-management skills" achievement in pre-application reached (12.11) with a standard deviation of (2.958), while the mean score reached in post application (was 19.77) with a standard deviation of (2.451). The earned mean score in Total E-management skills achievement was (7.657) with a standard deviation (of 3.143).

The value of the t-test between the two mean scores was (14.413), the value has a significance at the level of (0.05), and the calculated significance is equal to (0.000) and is less than (0.05).

The Impact Factor has been extracted using Eta2 via the t value resulting from the mean difference in Total E-management Skills achievement test for school leaders in pre and post-test. The Eta2 value was (0.859), indicating that the impact of the AI-based system moderately improved Total E-management Skills for school leaders.

-The second hypothesis:

**Table 5.***Results of one sample t-test to verify the differences between mean scores of E-Management skills observation card in post-application and mastery level (80%)*

| Skill | Mean | Std. Deviation | Mastery level (80%) | Earning Score | t | df | Sig. | h² |
|---|---|---|---|---|---|---|---|---|
| Visualization | 12.83 | 1.248 | 11.2 | 1.629 | 7.719 | 34 | 0.000 | 0.637 |
| prediction | 8.91 | 0.887 | 8 | 0.914 | 6.099 | 34 | 0.000 | 0.522 |
| Chatbot | 9.11 | 0.796 | 8 | 1.114 | 8.282 | 34 | 0.000 | 0.669 |
| e-survey | 12.66 | 0.873 | 11.2 | 1.457 | 9.880 | 34 | 0.000 | 0.742 |
| All E-Management Skills | 43.51 | 2.490 | 38.4 | 5.114 | 12.153 | 34 | 0.000 | 0.813 |

The following figure shows differences between mean scores of E-Management skills observation card in post application and mastery level (80%) for School Leaders.

**Figure** 1**1.** *Differences between mean scores of E-Management skills observation card in post-application and mastery level (80%) for School Leaders*
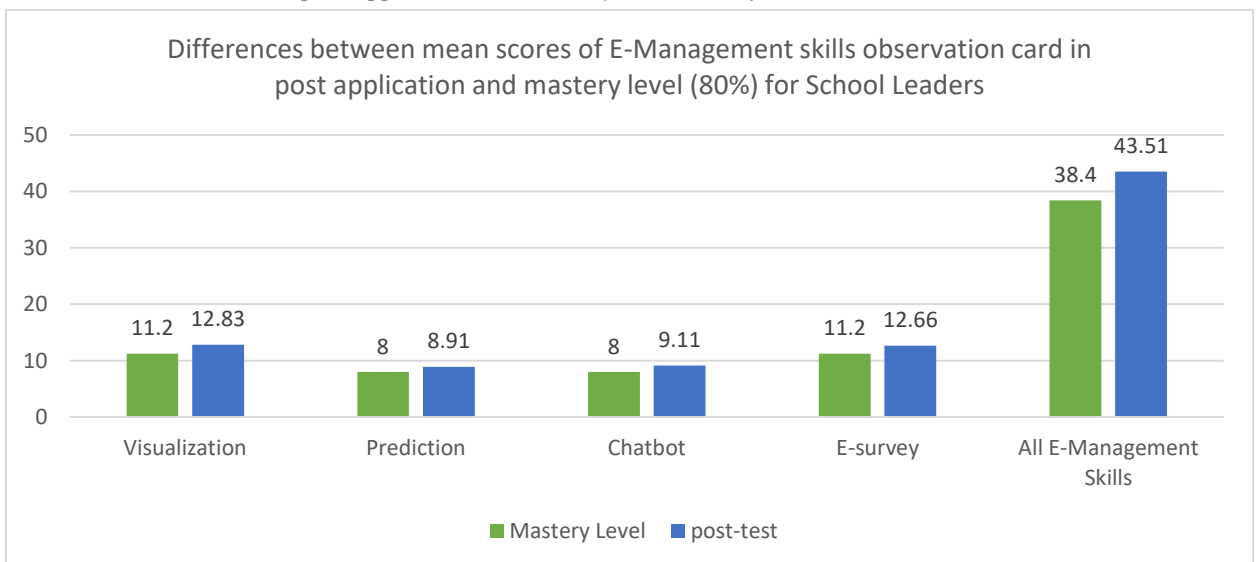


The Total skills in Observation Card mean scores in post application reached (43.51) with a standard deviation of (2.490), while the Mastery level (80%) was (38.4), the earned mean score in skills was (5.114), the value of the t-test between the mean score and mastery level was (12.153), this value has a significance at the level of (0.05), as the calculated significance is equal to (0.000) which is less than (0.05).

The Impact factor has been extracted using Eta2 via the t value resulting from the mean difference in technical skills in the observation card for post-application and Mastery level (80%). it turns out that the Eta2 value was (0.813), which indicated that the impact of AI-based systems effectively achieved to develop of E-management skills for school leaders. That means rejecting the null hypothesis and accepting the second research hypothesis

## 10.     Discussion:

This paper is an extension of a series of research investigating the impact of AI on educational e-management. The study shows that school leaders' skills have significantly developed due to the proposed AI-assisted system. In conjunction with the Saudi Vision 2030, educational institutions are requested to adopt modern technological features to make it possible to improve their outcomes.

The study outlines that school leaders' proficiencies regarding data analytics have elevated. Thus, the post-test reveals that the proposed AI-assessed system has positively impacted the leaders' decision-making competencies. An educational leader can improve their decision-making ability by drawing an evidence-driven decision rather than relying on blind faith or personal experience; hence the data-driven decision is more successful and reliable. Such a finding agrees with Rogge et al. (2017), who claim that data usage is beneficial in supporting decision-making in the education field. Predicting students' performance needs a machine learning binary classification model to divide learners into passed/ failed groups. The current research introduces a model supported by AI software that supports school leaders in predicting the future and drawing meaningful insight. Concurrently, predictive analytics have been tackled by Imran et al. (2019), who considered predicting students' performance using AI tools as one major responsibility assigned to the administrative sectors in schools.

Additionally, this paper ensures that the AI chatbot boosts leaders' communication skills with different stakeholders by enabling interactivity and responding to parents' queries which consume burden time. The research findings regarding the contribution of chatbots in the school management domain go in line with (Farkash, Z., 2018; Hien et al., 2018), which claim the effectiveness of chatbots for administrative purposes.
Data collection by e-survey is an essential tool for schools. This paper is an extension to the finding of Kristjansson (2013), that recognized some critical steps for implementing electronic surveys in gathering information in educational institutions.

Generally, AI-based applications have significantly influenced the leaders' e-management competencies in different domains in Saudi primary schools. However, the proposed AI-based system can be utilized within

different levels of education, such as middle and secondary schools, since the e-management skills are similar in all stages.

## Conclusion

Based on the study findings and other related research, implementing Artificial intelligence-based features in school management lead to elevating leaders' competencies and improving their performance. Thus, the study confirmed the effectiveness of AI-driven solutions as folAI-based features enable leaders to practice their daily tasks effectively.

- AI-based solutions enhance productivity and creation by facilitating repeated work and investing time.
- Data Analytics is a promising domain for educational management. Thus, data analytics enables leaders to visualize data and draw patterns that support decision-making.
- AI-driven features open avenues for predictive models that empower school management decision-making and setting plans.
- AI-based tools empower leaders to communicate effectively by using chatbots.
- AI-driven features allow leaders to monitor and diagnose workflow by creating dashboards.
- AI-powered tools facilitate and enhance exchange experiences within teamwork.
- AI-based options enhance information gathering from various sources.
- AI-assessed tools support e-planning in educational institutions.
- AI-based features enable leaders and policymakers to draw meaningful insights for the future.
- AI-powered technologies boost school involvement through rapid access to the required information.

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