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## CHATBOT MANAGEMENT OF THE DEPARTMENT OF HEI

The use of innovative technologies in communication with potential and existing students gives higher educational institutions an advantage over competitors. It is expedient for the management of the university, the faculty and the departments to review and select digital communication tools with education seekers, which not only address them, but also satisfy the needs of receiving timely feedback in real time. The challenge of response time lag between inquiry and response for education seekers can be solved with the help of chatbots. The purpose of the article is to form the theoretical and methodological foundations of the development of the HEI's department chatbot.

The following methods and techniques of economic analysis were used: induction, deduction, synthesis, statistical, mathematical. Metrics for assessing the effectiveness of the chatbot have been created (fulfillment of assigned tasks by the chatbot, demand, effective dialogue). The research hypothesis was verified (as the number of active users of the chatbot increases as a result of its management, the number of triggered streams (triggers) will increase and vice versa) through the formation of the parameters of the linear regression equation according to the Student, Fisher *t*-statistics criteria.

**Keywords:** management of HEI; chatbot management; chatbot strategies.

Currently, chatbots are involved in the implementation of many functions in the management of higher education institutions, including operational management, electronic document management, customer service, etc. Specialized customer service chatbots provide consumers with an interactive, convenient and fast way to communicate because they can handle inquiries and support consumers, eliminating possible

frustrations associated with waiting in line for consultation or delays in receiving and processing information, etc.

By 2021, brands that implement chatbots, their own websites to support visual and voice search, will increase their digital commerce revenue by 30%. And by 2022, 70% of employees will interact with conversational platforms every day. As a result, more HEIs are looking to invest in the development and deployment of chatbots as a core AI-based application. This testifies to the importance of creating chatbots in HEI as a tool for implementing a communication strategy that provides an effective solution for employees, customers and key partners, contractors, etc.

Acevedo, V. C., Daulerio, K., Fallon, M. A., Johnsrud, L. K., Robinson, C., Russo, T. J., Selingo, J. J., Serna, A., Stillman, D., Stillman, J., Tabata, L. N., Twenge, J. M., Weiner, B., Zhang, J. investigated the conditions of chatbot development and implementation. That is despite the fact, that now new approaches to the issue of chatbot development and implementation are used for various types of economic activity. The issues of the optimal strategy for managing the development of a chatbot in higher educational institutions remain unanswered.

In order to develop a chatbot for the Department of Management of the Faculty of Business and Law of LNTU, the following four main stages were followed.

First stage: collect pairs of sample questions and answers. About 10 samples of question types and their corresponding answers to students, applicants, teachers and support staff were collected to form a chatbot prototype. Since end users may ask the same questions, but their order frameworks and question types may be understood differently, 30 pairs of questions were created and the answers based on the original were reduced to 10.

The second stage: we decided on the types of answers. Based on the frequency of requests, we modeled how the chatbot would respond to each type of question. Some questions can be answered directly in the chat, while others will need to be directed to technical support; the right number of questions are aimed at other teams, both internal and external.

The third stage: review the prototypes of other chatbots of HEI. To review chats, the prototypes of other chatbots were evaluated, the benefits and time spent on their creation were compared, the potential of using support technologies and the development of the main advantages that were identified were studied.

The fourth stage: develop chatbot prototypes. For this purpose, a

free bot development site was selected and used. After compiling the main pairs of answers and questions, we posted the main questions and their answers on the platform. Often, such extensions work according to the scheme: drag-and-drop. Anyone can connect to the chatbot at: @dmLNTUbot.

Let's analyze the statistics of the chatbot @dmLNTUbot using flowxo's free analytical tools. We will evaluate the chat and content analysis.

The total number of unique users began to grow from July 2019, because it was then that the chatbot of the Department of Management @dmLNTUbot was created and launched and reached 97 people at the end of the studied period.

As of 05/17/2022, the total number of unique users increased from 71 (July 2019) to 97, which is 68 people (or 31.07%) more. Their number grew every month, and the largest increase was recorded during the period of the entrance campaign of LNTU – a monthly increase of 7 people. And during the following months, several users showed attention to the chatbot and turned to it for information.

You can always track the total number of chatbot users of the Management Department of LNTU for the specified time period and compare it with the corresponding previous period. The total number consists of new users and those who return for consultation again. The number of those who return for consultation again shows how many users repeatedly use the chatbot of the Department of Management of LNTU compared to the previous period. However, it should be noted that this indicator is especially important for those educational institutions that have a significant daily flow of visitors to the website, social networks, Instagram, etc. If the number of visits increases, it means that users were satisfied with the chatbot's response earlier and willingly choose the specified communication channel.

The constructed trend line by the method of least squares is:  $y = 0.0961x - 4116.3$ , and the coefficient  $R^2 = 0.9428$ , which indicates a dynamic growth of the total number of unique users. The value of the correlation coefficient indicates a close relationship between the analyzed indicators: the total number of unique users and the period of their visits to the chatbot.

Analysis of the total number of triggered streams (triggers) allows you to determine the frequency of fulfillment of the condition that sends an auto-reply or starts a chain of messages in a chat with a user. It proves that the curves of the statistical evaluation of the total number of active unique users (who interacted with the bot at the end of the month) and the total number of triggered threads (triggers) of the @dmLNTUbot

chatbot have a symmetrical arrangement. And this means that the overall rating of triggered flows for obtaining an auto-response was the highest in July-September 2022 (from 10 to 6), and in March – 4. A total of 42 triggers were created during the period under study.

The estimate of the total number of messages sent by the chatbot @dmLNTUbot allows us to record the highest value in July 2021 – 142, September, November 2021 – 64, March 2021 – 38, and the lowest values in April, May 2021 – 4.

At the end of the dialogue, the chatbot @dmLNTUbot offers the user to choose answers to the question «Are you satisfied with the answer?» from several options: «I asked about something else», «I did not understand the answer», «The answer did not solve the problem». From the answer, it is possible to identify the reason for the negative evaluation, analyze the history of the dialogue, and the user's time spent in the dialogue.

The hypothesis was formed and proved (for the general population) that with the increase in the number of active users, the number of activated flows (triggers) will increase and vice versa. The parameters of the hypothesis proving regression equation were formed and the dependence of the  $Y$  number of activated streams (triggers) on the  $X$  number of active users was established. Its parameters were estimated by the method of least squares. The statistical significance of the equation was checked using the coefficient of determination, Student's  $t$ -statistics, Fisher's  $F$ -statistics test. It was found that in the studied situation, 94.18% of the total variability  $Y$  of the number of triggered streams (triggers) is explained by the change in the number  $X$  of active users. In the parameters of the model, an increase in the  $X$  number of active users by 1 unit measurement leads to an increase in the  $Y$  number of activated flows (triggers) by an average of 0.745 unit measurement.

The Management Department of LNTU Business and Law Faculty has chosen a rule-based chatbot development strategy. This is due to the fact that the chosen strategy:

- corresponds to the state of the educational services market and the requirements of applicants. At the same time, the strategy of developing a chatbot based on the rules meets the requirements, taking into account the factors of the dynamics of the educational services market, the educational life cycle, the possibility of developing competitive advantages;

- corresponds to an acceptable level of risk that accompanies the strategy: the realism of the online service; there are no negative consequences in case of failure; the positive result increases, while the

risk of losses from failure to implement the strategy is absent.

If the chatbot development strategy meets the selected criteria, it means that its efficiency will allow to provide answers to requests around the clock; cost savings; to speed up the response time by automating the answers to the most frequent questions, thereby freeing specialists to solve more complex tasks; cross-selling of a complete portfolio of educational services; testing of knowledge and providing recommendations based on previous results of external examinations, etc. Chatbots, like any automation project, will improve the speed and quality of service, save costs, increase revenue, and strengthen the brand of HEI.

A rule-based chatbot development strategy is recommended for use and tools for its improvement are offered: dialogues in the @dmLNTUbot chatbot can be conditionally divided into three triggers: «Welcome series» (sends a message immediately after the client visits the chatbot); «Standard reply» (sends a reply to a message that does not contain keywords); «Unsubscribe from a bot» (sends a subscriber if they send the /unsubscribe or /stop command); recognition of individual words and phrases as a command. From the answers, it will be possible to identify the reason for the negative rating, analyze the history of the dialogue, and the user's time spent in the dialogue. This will increase the effectiveness of the department's chatbot interaction with students.

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## УПРАВЛІННЯ ЧАТ-БОТОМ КАФЕДРИ В ЗВО

Використання інноваційних технологій у спілкуванні з потенційними та наявними здобувачами освіти надають конкуренту



перевагу ЗВО. Керівництву університету, факультету, кафедр доцільно переглянути та вибрати цифрові інструменти комунікації зі здобувачами освіти, які не тільки звертаються до них, але й задовольняють потреби в отриманні своєчасної зворотної інформації у режимі реального часу. Виклик затримки часу реакції між запитом і відповіддю для здобувачів освіти можна вирішити за допомогою чат-ботів. Незважаючи на те що нині нові підходи до питання розробки та впровадження чат-ботів впроваджені за різними видами економічної діяльності, залишаються нез'ясованими питання оптимальної стратегії управління розробки чат-боту в ЗВО. Мета статті полягає у формуванні теоретико-методичних засад розробки чат-боту кафедри ЗВО.

Використано методи та прийоми економічного аналізу: індукції, дедукції, синтезу, статистичні, математичні. Сформовано метрики оцінки ефективності чат-боту (виконання чат-ботом поставлених завдань, затребуваність, ефективного ведення діалогу). Сформовано гіпотезу дослідження (зі зростанням кількості активних користувачів чат-боту внаслідок управління ним зростатиме кількість спрацьованих потоків (тригерів) і навпаки). Якщо гіпотеза  $H_0$  – кореляційний зв'язок між якісними ознаками не значимий, то гіпотеза відхиляється; конкуруюча гіпотеза  $H_1$  – кореляційний зв'язок між якісними ознакам значимий, то гіпотеза приймається. Перевірено достовірність гіпотез щодо коефіцієнтів лінійного рівняння регресії за критеріями  $t$ -статистики Стьюдента:  $12,07 > 2,262$ , то статистична значимість коефіцієнта регресії  $b$  підтверджується, а коефіцієнтом  $a$  можна знехтувати. Здійснено перевірку достовірності гіпотези щодо коефіцієнтів лінійного рівняння регресії за критерієм Фішера. Оскільки фактичне значення  $145 > 5,12$ , то відхилено гіпотезу  $H_0$  про відсутність статистичного зв'язку між досліджуваними явищами та прийнято гіпотезу  $H_1$ . Встановлено, що рівняння регресії є статистично значимим, а в параметрах моделі закладено при збільшенні кількості активних користувачів на 1 одиничний вимір призводить до збільшення кількості спрацьованих потоків (тригерів) в середньому на 0,745 одиничного виміру.

**Ключові слова:** управління ЗВО; менеджмент чат-боту; стратегії чат-боту.

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