Chatbot Maxi: A Virtual Certification Trainer in a Blended-Learning Concept

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Abstract—Chatbot Maxi was developed as part of a blended-learning concept to make a training for insulation material processing more flexible and location-independent. As a kind of digital tutor, Maxi takes on the theoretical part of the certification course, giving participants information on the properties, areas of application and processing of the products, as well as on regulatory issues. Maxi was realized with script-based chatbot tool Jix and uses a flexible structured dialog to guide users through topics and sub-topic in a didactical appealing, adaptive way. The positive feedback from the target group after the pilot phase shows that (and how) chatbots can become an integral part of a comprehensive blended learning concept in continuous education and company training offers.

Keywords—e-learning, digital learning, workplace learning, conversational learning, blended learning, conversational experience, conversation design, chatbots, artificial intelligence, AI, tutorial dialogue systems, certification training

1 Background

Chatbot Maxi was developed in 2021 with the support of time4you GmbH as part of a research project led by Prof. Dr. Christian Langenbach at Technische Hochschule Nürnberg Georg Simon Ohm (Nuremberg Tech) for the Franken maxit Mauermörtel GmbH. As a kind of digital tutor, Maxi takes on the theoretical part of a certification course.

The maxit Group develops innovative products and services for the construction industry and building trade. With the most modern state-of-the-art equipment, they produce paints and dry mortar (mixtures) as well as plasters, floor and thermal insulation composite systems in bags and silos. Therefore, they offer a comprehensive product range for the areas of shell construction, finishing and facades.

Technische Hochschule Nürnberg Georg Simon Ohm (Nuremberg Tech) is, with its 13,000 students, one of the largest universities of applied sciences in Germany. Nuremberg Tech develops ideas for the world of today and tomorrow, and investigates the key questions facing our society. In 13 faculties innovative teaching concepts provide fresh impetus for a modern teaching style.

time4you GmbH communication & learning develops bespoke turnkey solutions for e-learning, people development and professional training. Our core products are the IBT® SERVER software for learning management, training administration and talent management, as well as our IBT® Learning Content Management and our chatbot software Jix.

2 The idea: a chatbot as certification trainer

In 2019, maxit launched the ecosphere insulation system, an innovative mineral spray insulation that combines mortar technology with vacuum hollow glass spheres and is a resource-saving and recyclable alternative to conventional thermal insulation materials.

Since the processing of ecosphere products differs from that of conventional thermal insulation systems, maxit obliges companies that want to use ecosphere products to complete a certification course in which they learn the correct handling of the building material.

The certification course consists of a theoretical and a practical part. In the theoretical part, the participants receive information on the properties, areas of application and processing of the ecosphere products, as well as on regulatory issues. Based on that, the processing is then demonstrated and trained in the practical part.

The disadvantage of this concept is that it is very time-consuming. For each course day, six maxit employees are tied up for a whole day for the training, including organisation, preparation and follow-up. After ecosphere was nominated for the German Future Prize 2020, it was hardly possible to offer enough courses for all interested parties. In addition, the Corona pandemic made it even more difficult to hold the course.

Therefore, maxit decided to replace the training course, which up to then had been held entirely on site, with a blended learning concept, so that only the practical part would take place on site, while the theoretical part would take place flexibly online. To also strengthen maxit's innovative image, a chatbot was to be integrated into the blended learning concept.

3 The goal: time-efficient, location-independent training

The task of the chatbot should be to support or even partially replace the knowledge transfer for the certification and, thus, reduce the effort for the implementation of the certification courses.

After a more detailed needs analysis and weighing up the advantages and disadvantages, the cost of implementation and the expected benefits, it was decided that the main task of the chatbot would be to present the theory part of the certification. It should convey the basics systematically and in a structured way, flexibly and tailored to the respective participants; it should also support them as best as possible in building up solid product and action knowledge. However, individual counselling should not take place.

With the help of the chatbot, maxit wanted to achieve the following goals:

1. to be able to carry out more certifications while at the same time conserving its own personnel resources,
2. relieve staff of routine enquiries,
3. strengthen its own image as innovative and unconventional by using a chatbot instead of conventional online training,
4. offer more flexibility and variety in the teaching of theoretical content,
5. provide better insights into the actual needs and information requirements of the participants through evaluation and monitoring of the chat processes.

maxit's goal also is to decrease time and effort for the target groups to attend on-site trainings. The chatbot still provides a professional training opportunity for the users when on-site courses have to be canceled.

At the same time, the chatbot can probably be enabled to provide information about the products and certification with little additional effort, as the corresponding contents are discussed in the course anyway. This means that in a second step, yet another application scenario can be realised with little effort.

4 The benefit: flexible and adaptive learning

The analysis of the previous courses revealed two different groups of participants as the main target groups for the chatbot:

1. employees in consulting and planning (architectural offices, energy consultancies, construction planning companies, property developers).
2. employees in processing companies (bricklayers, painters, plasterers).

The vast majority of these target groups are men. More than half — about 60% — are between 40 and 55 years old, 30% are between 25 and 40 years old, and only 10% are younger than 25.

Employees in consulting and planning usually have a university degree and very good IT skills. In contrast, those in processing companies typically have a sound practical or technical training as journeymen or master craftsmen, but fewer necessary IT skills. All of them are motivated, willing to learn and open to new things — otherwise there would hardly be any interest in the ecosphere products and their use.

The digitalisation of the theoretical part offers the greatest added value for the target groups due to the considerable time and effort savings for the participants. Only the practical part of the certification course requires on-site presence at maxit; the theoretical part can be completed at one's own convenience and at a time that best suits one's own everyday working life.

One of the main advantages for the users is an increased flexibility for learning, both timewise and in terms of mobility. They can access the software from their mobile devices and study at their own pace. All information about the ecosphere products is presented in small, compact units, which can me more easily "digested" by the learners than long texts.

Users can choose when, where and what they want to study, as the chatbot adapts to their individual daily schedule and needs. Also, direct feedback from the chatbot allows

for the detection of individual learning deficiencies, so that the users can easily catch up on their individual gaps.

The use of a chatbot is more attractive than conventional online training because, on the one hand, it enables individually adapted conversation processes and, on the other hand, it is new, innovative and less burdened with negative expectations.

The certain "fun factor" in the interaction with the chatbot also promotes the absorption and processing of the knowledge conveyed by the chatbot.

To offer the target groups even more added value, the chatbot was also integrated into the certification process. This includes:

- the final verification of what has been learned in a short test,
- followed by the automated issuing of the certificate of participation and
- registration for the practical part of the course at one of the maxit locations.

5 Dialog design: a guided tutorial dialog

Chatbot Maxi guides the users through the ecosphere insulation products and enables each user to learn in his or her individual learning pace. He gives the users a sense that they are talking to a colleague who is well versed in the ecosphere insulation products and likes to share his/her knowledge. Maxi is friendly, helpful, open-minded, competent and understanding and has a good sense of humour.

Maxi offers the users a choice of topics and subtopics (i.e., product features, system structure or technical parameters). The chatbot dialog is structured in three parts:

- Introduction
    - Company information
    - Heat insulation
    - Development of the *ecosphere* insulation system
    - Success of *ecosphere* insulation system
- Main Part
    - Product Information
    - Treatment
    - Application Area
    - Building-authority approval
    - Advantages of the *ecosphere* insulation system
- Final Part
    - Questionnaire
    - End

The dialog consists of a mixture of target-oriented and topic-oriented sequences. After having chosen one topic, Maxi gives explanations and asks if the user requires more information on that topic.

Example:
Maxi:

As you know, maxit has already been working for years successfully in the area of heat insulation systems. Let me tell you some facts about that.
[fact block about heat insulation]
Do you want me to tell you more about it?

The user can either choose "Yes, more information" or "Let's go on". It is also possible to enter free text. Subsequently, Maxi will follow the chosen path.

Bit by bit, the user is guided through all topics of the certification course and finally will be able to successfully complete the final assessment questionnaire.

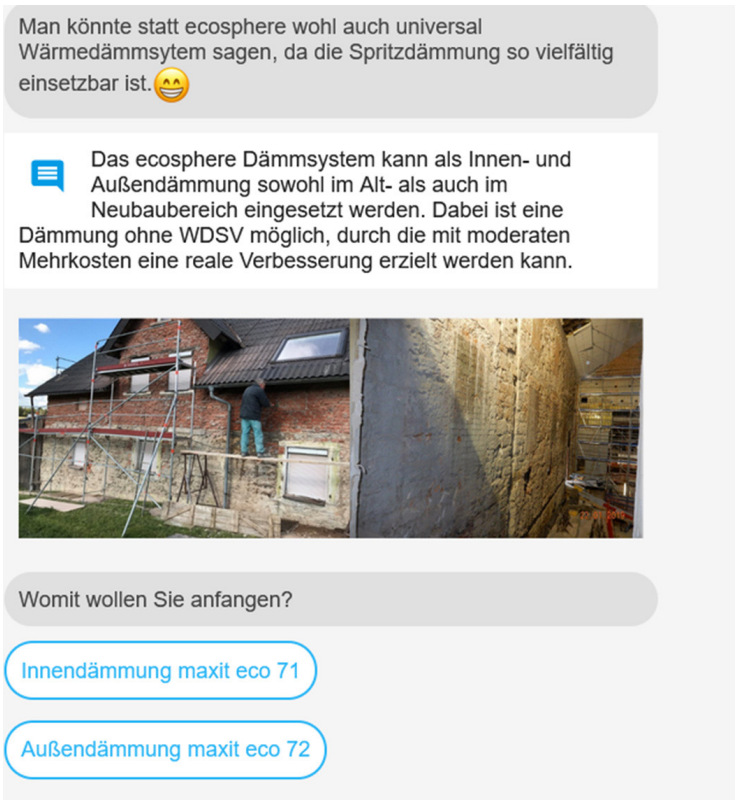

Fig. 1. Typical dialog prompt of chatbot maxi

6 The technology: Jix

For the selection of the tool with which the chatbot was to be realised, a primarily rule-based and a primarily NLU/ML-based tool were evaluated, namely Jix 3.1 by time4you and the open-source tool Rasa. No programming knowledge is necessary

for either tool. In Jix, chatbot production takes place via the scripting language Liza Script, which is used to formulate dialogue progressions and contributions. Rasa works with a command line, via which commands for the setup and training of the chatbot are entered.

The first step was to evaluate how well the previously identified requirements regarding security, functionality, reliability, competence, user-friendliness, portability, efficiency and design of the chatbot could be implemented with the two tools. Both tools performed similarly, with a slight advantage for Jix, which was mainly due to the better user-friendliness of the production tool. Jix proved to be significantly more flexible and more functional than Rasa when it came to design functions. These included, among others:

- different types of output, differing in shape, colour and time of output,
- the possibility to output alternative text passages or text variants by random selection,
- "remembering" topics that have already been discussed,
- a hybrid form of communication: possibility to use buttons and free text and
- an adaptive button display — i.e., buttons of already discussed topics should be able to be hidden

These requirements can be easily implemented with Liza Script, whereas Rasa requires some intervention in the programme code.

So the choice fell on Jix. A choice that the Master's student was very happy with right up to the end, because Jix's promise that powerful and diverse chatbots could be implemented in a relatively short time, even without programming knowledge, actually proved true. By her own admission, this not only gave her much more time for conceptual questions, but the variety of functions possible with Jix also opened up further possibilities for conversation design during the development of the chatbot.

7 Conclusions

As brand ambassador and "intelligent training assistant" for the maxit Group, chatbot "Maxi" succeeds in taking over part of the theoretical training for the compulsory *ecosphere* insulation system certification course. Maxi has proved its good usability by receiving positive feedback from the target group after the pilot phase.

The fact that he succeeds in this is due on the one hand to the thorough needs analysis and clear formulation of the use case, and on the other hand to the skillful and target group-oriented way in which he conducts the talks.

Chatbot Maxi, thus, shows that (and how) chatbots can become an integral part of a comprehensive blended learning concept in continuous education and company training offers.

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9 References

[1] Beate Bruns: Wie konzipiere ich einen Lernbot? Conversational Learning und die Suche nach der Antwort auf "alles". In: Andreas Hohenstein, Karl Wilbers (Hg.): Handbuch E-Learning. 79. Erg.-Lfg., Februar 2019.

[2] Beate Bruns, and Cäcilie Kowald: New Learning Scenarios with Chatbots: Conversational Learning with Jix: From Digital Tutors to Serious Interactive Fiction Games. In: International Journal of Advanced Corporate Learning, 12(2), 2019. https://doi.org/10.3991/ijac.v12i2.11176

[3] Franken Maxit Mauermörtel GmbH & Co: Ecosphere – Technology by maxit. https://www.maxit-ecosphere.de

[4] Franken Maxit Mauermörtel GmbH & Co: Maxit. https://www.maxit.de

[5] Natalie Opel: Conversational Learning im Kontext der betrieblichen Aus-und Weiterbildung. Konzeption und prototypische Realisierung eines intelligenten Assistenten für Schulungs-und Zertifizierungsaufgaben am Beispiel der maxit Gruppe. Masterarbeit im Fach Betriebswirtschaftslehre/Schwerpunkt Digital Busi-ness an der Technischen Hochschule Nürnberg Georg Simon Ohm, 2021.

[6] Technische Hochschule Nürnberg Georg Simon Ohm: Strategie und Profil. https://www.th-nuernberg.de/hochschule-region/strategie-und-profil/

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