Information about learning research for participants and recruitment. This information has been submitted to the Tokyo Tech Human Research Ethical Application Committee for Review as of April 20, 2020.

(1) Research summary
Research title: "Improving online course quality using learners' behavior and clickstream data"

Online learning is becoming increasingly popular especially for higher education, as it offers knowledge and information for learners on an online platform, thus decreasing the effect of financial and geographical limitations. However, unlike in a classroom, learners are free to follow their own pace and to skip certain parts and focus on others which may not lead to the optimal outcome. The lack of communication between teachers and learners also makes it hard for course providers to get essential feedback from learners about details in the course and to assess their engagement with it.

This research in an attempt to overcome these obstacles. We will conduct an analysis of learners' clickstream data while taking an online course offered by Tokyo Tech on EDX or edge.edx platform in an attempt to establish a link between learners' behavior and their engagement and performance on the course and to use these results to improve future offered courses.

Duration of research: From approval date in May 2020 to March 31, 2025.

(2) Significance and goals of research

The purpose of this research is to explore how online courses can be improved and adapted for personalized learning by following Learners' behavior and engagement with the course material. It will mainly focus on:
- Investigating ways to interpret and transform clickstream data into useful feedback from learners, and creating a link between learners' interactions with course material and their engagement and performance throughout the course.
- Getting feedback from learners through their clicks and interactions with the course content, without needing to ask them to fill out forms or surveys.
- Using this feedback to create courses with more suitable composition to our target learners.

Clickstream data will also be used to customize course content based upon what materials or contents learners wish to study taking into account their prior knowledge.

(3) Research methods
The research will be conducted on Tokyo Tech offered on this SPOC (Small Private Online Courses) on ethics using the edx edge website https://edge.edx.org/. Tokyo Tech is a member of edX and follows the edx learner privacy policy.

We will be collecting and analyzing learner's clickstream data (accessing course content, time spent learning, assessment results and related information) while taking this course.
Learners will not be asked to answer any additional surveys related to this research nor to provide any extra information, the data will be automatically collected by edX learning management system as they progress normally through the course.

This data will be transformed into useful feedback on:
-Learner's behavior and learning style.
-Learner's engagement with the course.
-Learner's preferences and opinions about different components and contents of the course.
This feedback will be used to investigate the elements leading to course failure or success, learner's engagement and interest, and to understand learners' preferences regarding course composition (Videos, texts, quizzes...), finding the optimal placement of assessments within the course material, using a certain degree of language complexity...
The results of this research will be used for modifying future online courses offered by Tokyo Tech and for improvements of the current course quality.

(4) Storage of specimens and their use in other research
 The collected data will be anonymized twice and stored in a password protected machine located in OEDO office, making it non-traceable and inaccessible to anyone outside of the research team. The data will only be used for research aiming to improve the online learning experience offered by Tokyo Tech. it will not be used in any other research outside of this scope.

(5) Forecasting results (merits and demerits)
 During this research, the clickstream data will be automatically collected as the learners progress on their own pace and interact with the material throughout the course.
 They will not be asked to perform any extra actions, nor to provide extra information besides completing a pre-post course survey. Thus the time and effort spent on the course will not be affected by the data collection.
We do not predict risks for participants in this research, however if you face any issue please contact us.
 Since the results of this research will be used to improve Tokyo Tech's future courses, we believe that participating in this research will be beneficial for the learners.
If you are a student of Tokyo Institute of Technology and you believe that you are being adversely impacted by this experiment, please reach out to Tokyo Institute of Technology's Harassment Office (contact details listed below).

(6) Cooperation with the research is voluntary and retraction of consent is possible at any time
 You have the complete freedom to participate or not participate in this research project.
 Furthermore, if you no longer wish to cooperate even after having previously given consent, as soon as a request for retraction is received, further experiment will be cancelled and data extraction will stop. However, since data already harvested have been non-traceably anonymized, harvested data cannot be destroyed. Retraction of consent after data harvest is not possible.

(7) Protection of personal information
 Because the name of the research subject accompanying the clickstream data is anonymized, personal information regarding the research subject can in absolutely no way be leaked outside of the research team.

(8) Publication of the research results
 Research results may be publicized through academic associations in the online education and analytics fields, such as the Japan Society for educational technology; committees of specialists; international meetings; and in educational and computational journals.
 In such cases as well, absolutely no identifiable information specific to participants are released.

(9) Expenses

    The research subjects will bear absolutely no supplementary expenses for the tests and analysis that accompany the research.

    There is no remuneration for the participants to participate in this experiment on click stream data whereas learner' who participate in research on metacognition can receive a book coupon of 1000 yen based upon a raffle.

(10) Compensation for adverse health effects

    No adverse health effects are anticipated. Should problems arise, please do not hesitate to contact the designated person for this research (contact details below).

(11) For inquiries regarding this research:

    General Affairs and Management Group, Research Planning Division, Tokyo Institute of Technology
    Tel: 03-5734-3808 / 7223 (Weekdays, 8:30 a.m. - 5:15 p.m.)
    Email: hitorinri@jim.titech.ac.jp

    ・Contact regarding the research
    Professor Jeffrey Scott Cross, General Manager, Online Education Development Office, Tokyo Institute of Technology
    Tel: 03-5734-3445 9AM – 5PM
    Email: cross.j.aa@m.titech.ac.jp / oedo@citl.titech.ac.jp

    ・Contact for harassment issues
    Harassment Office, Tokyo Institute of Technology
    Tel: 03-5734-2045 (Weekdays, 8:30 a.m. - 5:15 p.m.)
    Email: soudan@jim.titech.ac.jp (limited to harassment issues only)

Research theme:
 "Improving online course quality using learners' behavior and clickstream data"

Online learning is becoming increasingly popular especially for higher education, as it offers knowledge and information for learners on an online platform, thus decreasing the effect of financial and geographical limitations. However, unlike in a classroom, learners are free to follow their own pace and to skip certain parts and focus on others which may not lead to the optimal outcome. The lack of communication between teachers and learners also makes it hard for course providers to get essential feedback from learners about details in the course and to assess their engagement with it.

This research in an attempt to overcome these obstacles. The Online Education Development Office of Tokyo Institute of Technology will conduct an analysis of learners' clickstream data while taking an online course offered by Tokyo Tech on EDX or edge.edx platform in an attempt to establish a link between learners' behavior and their engagement and performance on the course and to use these results to improve future offered courses.

To carry out this research, we will recruit subjects to participate in this research.

・Research site : OEDO Office Room 720 West 9 Building, Ookayama Campus, Tokyo Tech, Tokyo Japan
・Research time period : From application approval date in May 2020 to March 31, 2025.
・Date and time for research participation : Learners will participate in the research while they are taking online courses for several weeks or up to one year at their own pace. After students take the course and complete it they still retain access to the educational materials.
・Compensation for research participation: We do not offer compensation for participating in this study.
・Handling of personal information : The data used will be anonymized kept confidential for 10 years then distroyed.

・Publication of research documents: The results of this research may be published in scientific journals or conferences, however the shared data will be anonymized and will in no way be identifiable or traceable to the participating individual.

・Case of cancellation of research : all the collected data will be destroyed.
・Merits/demerits of research participation and possibility of injury : During this research, the clickstream data will be automatically collected as the learners progress on their own pace and interact with the material throughout the course.
They will not be asked to perform any extra actions, nor to provide extra information besides completing a pre-post course survey. Thus the time and effort spent on the course will not be affected by the data collection.

We do not predict risks for participants in this research, but we believe that the results will benefit learners who will enroll in future Tokyo Tech offered online courses.

・Post-research procedures and publication of research results：The result of this research study will be produced in the form of a conference or journal articles. The researcher should be reachable through the contact information provided by the publishing journal (most likely, email).

＊＊＊ Inquiries to: ＊＊＊
Person responsible for research: Prof. Jeffrey Scott Cross
Person in charge of description: Lina Aouadi, Online Education Development Office Teaching Assistant and learning analytics researcher.

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