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研究課題名（和文）ICT Tools for Effective Formative Assessment in Fostering Learning How to Learn Skills

研究課題名（英文）ICT Tools for Effective Formative Assessment in Fostering Learning How to Learn Skills

研究代表者

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研究成果の概要（和文）：ICTツールを利用した効果的な形成的評価の実践を調査し、教師が形成的評価のためのICTツールを簡単に使えるようにした。各I C Tツールの有用性を確認するための検証も行った。文献調査などを通じて、形成的評価のためのICTツールの実践事例の集め、それをもとに日本の文脈で利用できるツールを基にホームページを開発した。その際に、授業で利用できるためのパイロットを行い、その結果からホームページのコンテンツを修正した。形成的評価のためのICTツールが教育学的意味についてさらに調査した結果、授業の成果をより効果的な高めるために教室での形成的評価をなんらかの形で導入しなければならないことは判明した。

研究成果の学術的意義や社会的意義
Our investigation led to technology-usage in better designed lessons as a potential solution to enhance learning skills to increase out-of-class study time for students. It was found that ICT tools could be leveraged to a more effective scale if the instructor better understood lesson design.

研究成果の概要（英文）：The project started out by investigating how to enhance learning skills to increase out-of-class study time for university students. Investigations of ICT tools revealed that most tools focused on feedback and not on enhancing the five principles of formative assessment. After collecting many ICT tools that were thought beneficial to enhance formative assessment in the subject context a website was created to share these tools. However, a lack of evidence to data from most ICT tools, we sought out to collect this data to add or delete any ICT tools that did not fit subject context. It was found that ICT tools could be leveraged to a more effective scale if the instructor was better versed in FA and its five principles, and thus, suggesting that teacher training should aim to deepen the knowledge and skills of how to use the ICT tools for formative assessment by using it to share learning goals and success criteria, allow for peer learning and for more autonomous learning opportunities.

研究分野：英語教育学

キーワード：Formative Assessment　ICT Tools　University Context　Lesson Design

１．研究開始当初の背景

Formative assessment (FA) is not a summative test to assess how much is learned but a process to support learning by emphasizing metacognitive skills (Clark, 2012). FA consists of (a) teacher adjustments to teaching and learning in response to evidence, (b) students' receiving feedback about learning with advice on what to do to improve, and (c) students' self-assessing learning (Hudesman et al., 2013). Nicol and Macfarlane-Dick (2006) proposed a model of FA representing processes internal to the learner. The model emphasizes seven principles of FA practice that fosters learning skills. Effective use of these principles allows instructors to take more facilitative roles as learners become more proactive in their learning by using feedback more effectively ultimately fostering learning skills (Nicol & Macfarlane-Dick, 2006).

Recently, it has been argued that FA "lends itself to greater use of web-based activities" (Saglam, 2017, p. 323) for effective moment to moment instructional feedback. Web-based FA reduces time for assessment preparation and reporting, also providing opportunities for repetition creating a culture of learning through individualized instruction. Crockett (2017) introduces us to three stages of FA: Pre-Assessment, During-Assessment, and Post-Assessment. Pre-Assessments help identify misconceptions with activities such as concept maps (i.e., type of graphic organizer used to help students organize content knowledge) or minute papers (i.e., a method of ascertaining if students have understood the main point of lectures by answering a series of simple questions). During-Assessments make the learning progress visible. Classroom strategies such as think a-louds help learners with comprehension and clarify understanding. Post-Assessments determine learner achievement and include activities such as portfolios and peer assessments.

Learning skills consist of metacognitive awareness about the learning process and metacognitive strategies necessary for learners to become more skillful independent learners. Metacognitive awareness refers to knowing about the self as a learner (e.g., learning preferences) and understanding the process of learning (e.g., importance of self-regulation) (Nisbet & Shucksmith, 1986).

For over 30 years, research has argued for the explicit teaching of learning skills (cf. Wenden & Rubin, 1987; Dam, 1995; Victori, 2007; Fukuda, et al., 2016). Developing learning skills interrelates with the development of life-long learners, a key 21st century skill (AACTE, 2010). From a language learning perspective, learning skills allow learners to continue learning at every stage of the learning process (Little, 2004). Though Fukuda et al. (2017) found a strong correlation between explicitly developing learning skills and out-of-class study time; time constraints and lack of teacher training make explicit training of learning skills unfeasible in most Japanese university contexts. Thus, effective FA practices may hold the key to developing learning skills and ultimately life-long learners.

２．研究の目的

In-house reports at the author's institution have identified that 70 percent of university students' study less than 30 minutes per week. This problem may stem from learning experiences encountered before matriculation as students feel a lack learning skills. With more emphasis placed on active and independent learning, superficial learner engagement may become an important issue to tackle moving forward. For an increase in study time (Fukuda et al., 2017) and deeper learning that come from learning skills development, effective FA assessment practices can be said to be become ever more critical.

Attempts to increase (a) content knowledge (e.g., Remedial Courses), (b) study skills (e.g., Freshman Seminars), (c) learning motivation (e.g., Freshman Guidance), and (d) out-of-class study time (e.g., Self-Access Centers and e-Learning Systems) have failed to reach a wider audience. Nevertheless, as argued by Lander (2013), active and independent learning can be enhanced using technology. If instructors could effectively and systematically use FA, it would allow instructors to facilitate learning more effectively. Feedback becomes quicker with technology-advanced ICT tools allowing for more engagement in learning. This in turn, deepens students' understanding of their learning processes; ultimately, developing students' learning skills. Instructors should be equipped with these ICT tools to better FA practices and assist in developing students' learning skills. For instance, to overcome the time and validity limitations, instructors would benefit if ICT tools for FA were immediately available on a website for instance. These ICT tools would allow for quick student feedback, measure learning, and deepen collaboration during the learning process and thus, allowing for better FA practices and ultimately fostering students' learning skills with minimal influence on syllabi and current classroom instruction.

A user-friendly website that assists instructors in effective FA practices would compile ICT tools that were effective in all classrooms to ensure valid feedback and expedite learning. Instructors distressed about class size have difficulty placing emphasis on independent learning. However, systematically incorporating FA in the learning process may be key in developing learners' language

skills and ultimately students' learning skills (OECD, 2005). Before dissemination of ICT tools for FA practices to foster learning skills, critical will be an investigation of the different ICT tools available by measuring their feasibility for subject contexts. For instance, guiding questions could be: (1) What ICT tools facilitate FA practices? and (2) How are these tools used to practice FA that fosters students' learning skills?

３．研究の方法

The focus of the project was an investigation of effective FA practices and to use that data to share ICT tools for FA on the website. However, it was necessary to conduct examinations of ICT tools for FA in the subject context. This project was conducted in three stages. In Stage 1, a preliminary investigation was conducted of advanced and successful FA practices using ICT tools in learning contexts around the world through literature reviews, international conference attendances of educational technology and assessments, and university visitations. Then, in Stage 2, while developing the website of ICT tools for FA, pilot studies were conducted using tools to test feasibility in the subject context. This information of ICT tools for FA was then used to better website content. Finally, in Stage 3, ICT tools for FA were investigated more for pedagogical implications.

４．研究成果

This project started out identifying students lack of out-of-class study time that stemmed from a lack learning skills. Investigation of this phenomenon led to previous research claiming that to increase in out-of-class study time and deeper learning comes from learning skills development in which the subject context would benefit from better FA practices in classrooms. Furthermore, our own previous research pointed towards leveraging technology to support this learner training and enhancement of FA. For instance, feedback becomes timelier quicker when leveraging ICT tools enhancing more engagement in learning which in turn deepens students' understanding of their learning processes, and ultimately, developing students' learning skills. Thus, we aimed to develop a platform to equip language instructors with these ICT tools to implement better FA practices and assist in developing students' learning skills by introducing instructors to the available tools through a website. All the ICT tools that we found would quicken feedback, measure learning, and deepen collaboration during the learning process were listed in the hope that they would help foster students' learning skills with minimal influence on syllabi and current classroom instruction. After that we wanted to have evidence-based confirmation that the ICT tools listed did in fact enhance FA and to gain a deeper understanding of the instructor's role in enhancing FA, which led to two guiding questions: (1) Do ICT tools facilitate FA practices as they say they do? (because many of the software websites did not provide evidence-based data) and (2) Does the teacher need to have a deeper understanding of FA in order for the ICT tools to be leveraged?

The study in Stage 3 set out to find answers to these questions. Pre-survey results found most participants already had experience using ICT tools in their learning (i.e., learning a second language). However, no students reported experience with any of the five FA principles (i.e., using ICT tools to understand learning targets and success criteria). These responses may be related to a situation in which the universities are still underdeveloped in terms of ICT or that university instructors lack of understanding of FA principles or how the make better use of the ICT tools. It must be noted that the study started prior to the Covid-19 pandemic. Certainly, the situation may be different now due to the influence of this pandemic. Nevertheless, a survey of online lessons in which 337 national university instructors responded illustrates this status-quo (EdTech Zine, 2020). Results reveal that more than 75.9 percent (N=256) instructors conducted online lessons by lecturing without video and just their voice showing PowerPoint slides. It should be noted that the advantages and disadvantages of this have yet to be examined.

Two hypotheses were formulated for the two investigations in Stage 3. The hypothesis for Study 1 was ICT tools enhance the five principles of FA from the students' perspective. Data from 85 participants suggested that ICT tools may enhance FA from the students' perspective after experience using ICT tools with an instructor that was well-versed in FA. These results illustrated the potential ICT tools for FA have in the classroom to gain learning skills from experiencing FA. The hypothesis for Study 2 was ICT tools improve FA practice regardless of teacher knowledge. Through our data analysis, we could only slightly confirm that teacher knowledge influences the ICT tools based on the five principles of FA. Our data resulted in a medium effect size for four out of the five FA principle, and a large effect size for one. Thus, results suggesting that teacher knowledge somewhat influenced how well the ICT tools investigated claimed to enhance FA. Medium effect sizes for the second and third FA principle were found suggesting that simply incorporating the tool in class could enhance classroom discussion and feedback from the teacher without a deep knowledge of FA. For the first, fourth, and fifth FA principle a larger effect size was found suggesting if instructors trained themselves in these principles of FA, the learning environment and experience would benefit students more. As long as the ICT tool is an add-on to the course and not the center of the course or lesson it does have

potential to better the learning environment, however, with teacher training in FA, the ICT tools would have potential to better the learning environment. Thus, pedagogical implications for this study do suggest that instructors would benefit from using ICT tools in the classroom for FA if they have knowledge in FA or not, but would be at a greater advantage with a better understanding of FA as a practice. The training would be most beneficial if it focused on the first, fourth, and fifth principles of FA. In other words, teacher training should aim to deepen the knowledge and skills of how to use the ICT tools to share learning goals and success criteria, allow for peer learning and for more autonomous learning opportunities.

Finally, we should also take in Brookhart (2010) suggestions of how FA can be practiced in five stages in teacher-training focused on lesson design. First, instructors should clearly communicate the learning targets and success criteria to reach those targets. Then, instructors should provide examples of the learning outcomes which students can then use to determine their learning plans. Next, instructors should implement self-, peer-, and teacher-assessment and use the information gathered to work with students to close the gap between current levels and the learning target. Afterwards, instructors should provide opportunities for students to use each other to continue to gather information on their learning to better future learning. Towards the end, instructors should gradually hand over the learning responsibility to students giving them more say in learning targets, and activities.

The investigations in both studies were small-scale and introductory. An argument can be made for Study 2, in that comparing two different tools in the same course with the same participants may render different results. We did this so we could collect data on more than one tool in a short amount of time. Furthermore, our questionnaire was adopted and translated into participants target language, we did conduct two back translations with native speakers. However, the questionnaire itself was not tested for validity or reliability, which will need to be done in future studies. Future studies can investigate the validity and reliability of the FFF for FA model as well. More indirect data collection techniques can be developed as well as adding more items for each category which may result in different conclusions. In future studies, the ICT tool selection criteria should be tested as well. In our study, readers may ask, are there other ICT tools that can do better? It is our hope that any tool claimed to enhance FA be evidenced-based.

In sum, the project started out by investigating how to enhance learning skills to increase more effective out-of-class study for university students. Our investigation led to technology and FA as a potential solution. A look into ICT tools, however, revealed that most tools focused on timely feedback and not enhancing the five principles of FA, or lack of evidence to show for this. Thus, after collecting many ICT tools that were thought beneficial to enhance FA in the subject context a website was created to share these tools. However, a lack of evidence to data from most ICT tools, we sought out to collect this data to add or delete any ICT tools that did not fit the FA principles. In doing so, we started the investigation with different ICT tools. Our investigation found that ICT tools did enhance FA somewhat in the classroom as claimed by its developers via websites. Regardless, it was found that ICT tools could be leveraged to a more effective scale if the instructor was better versed in FA and its five principles, and thus, suggesting that teacher training should aim to deepen the knowledge and skills of how to use the ICT tools for FA by using it to share learning goals and success criteria, allow for peer learning and for more autonomous learning opportunities. In sum, our study suggested that adding ICT tools for FA into the classroom enhances FA but could potentially better learning outcomes if instructors deepened their knowledge of FA.

T tool is a valuable learning tool.

５．主な発表論文等

〔雑誌論文〕　計2件（うち査読付論文　1件／うち国際共著　1件／うちオープンアクセス　1件）

１．著者名 Steve T. Fukuda, Bruce W. Lander, Christopher J. Pope	４．巻 na
２．論文標題 Formative Assessment for Learning How to Learn: Exploring University Student Learning Experiences	５．発行年 2020年
３．雑誌名 RELC Journal	６．最初と最後の頁 na
掲載論文のDOI（デジタルオブジェクト識別子） 10.1177/0033688220925927	査読の有無 無
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Steve Fukuda, Bruce Lander, Christopher Pope	４．巻 n/a
２．論文標題 Formative Assessment for Learning How to Learn: Exploring University Student Learning Experiences	５．発行年 2020年
３．雑誌名 RELC Journal	６．最初と最後の頁 n/a
掲載論文のDOI（デジタルオブジェクト識別子） なし	査読の有無 有
オープンアクセス オープンアクセスとしている（また、その予定である）	国際共著 該当する

〔学会発表〕　計2件（うち招待講演　2件／うち国際学会　0件）

１．発表者名 Steve T. Fukuda
２．発表標題 How the Guided-Autonomy Syllabus (GAS)　and Formative Assessment (FA)　develop Self-Regulated EFL Learning Skills (SRL)
３．学会等名 Soka University PD Session（招待講演）
４．発表年 2020年～2021年

１．発表者名 福田スティーブ利久
２．発表標題 自律英語学習者を育成するGuided Autonomy Syllabus (GAS)
３．学会等名 関東甲信越英語教育学会（招待講演）
４．発表年 2019年

〔図書〕　計0件

〔産業財産権〕

〔その他〕

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6．研究組織

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7．科研費を使用して開催した国際研究集会

〔国際研究集会〕　計0件

8．本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関