Impacts of a Whole Person eAssessment on Students' Learning Performance and Faculty Development

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***Abstract*— We have developed an open education community based on our homegrown instructor-centric eTeaching system called TIES since 1996. Its mission is to share educational content and pedagogical knowledge via the interuniversity collaboration. We currently host 83 universities in Japan and abroad with about 1,300 instructors and 70,000 students as users, and have more than 39,000 sharable materials. TIES has an eAssessment system that assists an instructor to evaluate learning outcomes and levels of attainment of her students from a wide spectrum of their academic as well as non-academic efforts and performance. The purpose of the system is to encourage students to self-review their intellectual growth, reflect on their personal attributes, and understand their strengths and limitations. In this paper we elaborate impacts of this system on students' learning performance from faculty development perspectives. We also report preliminary results of the new questionnaire that approximates students' learning preferences, and analyze if such preferences can be correlated with the specific assessment attributes in the TIES eAssessment.**

Keywords-TIES; eTeaching; eAssessment; faculty development; learning styles

I. HOW TO EVALUATE STUDENT LEARNING?

We all know that assessment is the most important issue with students and it defines their learning behavior in higher education. Unfortunately, we observe a well-known problem of "surface learning" or memorization-only learning with little retention or use of knowledge after passing course. Thus we may have to conclude that our conventional assessment method of grading students' achievement via tests and quizzes may not be enough to motivate and direct their learning toward "deep learning" [1].

In this paper, we first illustrate our eAssessment system that complements a standard method of marking students' academic performance by encouraging students to recognize and develop their personal attributes and social skills. Second, we report preliminary results of the questionnaire developed to identify and approximate a learner's learning preferences through his preferences for teaching styles. The questionnaire attempts to identify learning preferences of a student in four criteria: Logic, Planning, Emotion, and Creativity (LPEC in short). Third, we draw implications based on the data obtained from courses, and elaborate possible impacts of the new assessment approach on our pedagogical thinking and faculty development (FD in short).

II. A BRIEF REVIEW OF TIES SYSTEM

We have developed an instructor-centric "eTeaching" system called TIES since 1996 at Tezukayama University. Its goal is to help motivate and direct instructors to use IT effectively and happily, so that students in turn can get motivated and self-directed to improve learning by engaging in face-to-face, online or blended courses more happily and willingly.

TIES community has started as a grass-roots initiative among a few instructors, and developed the concept of eTeaching based on the three principles of (1) interuniversity collaboration, (2) content and knowledge sharing, and (3) contribution to society.

Fig. 1 summarizes the concept of eTeaching, where eLearning is considered to be a subset of the system inside the TIES eTeaching community supported by TIES Support Center (TIES SC in short) and interuniversity membership.

TIES SC has helped us to develop the instructor-centric teaching-learning culture, and enabled our community to grow steadily. We are currently hosting 83 universities mostly in Japan, with about 70,000 student users, and almost 1,300 faculties. The educational materials created by instructors are sharable, and amount to about 40,000 as shown in Table I.

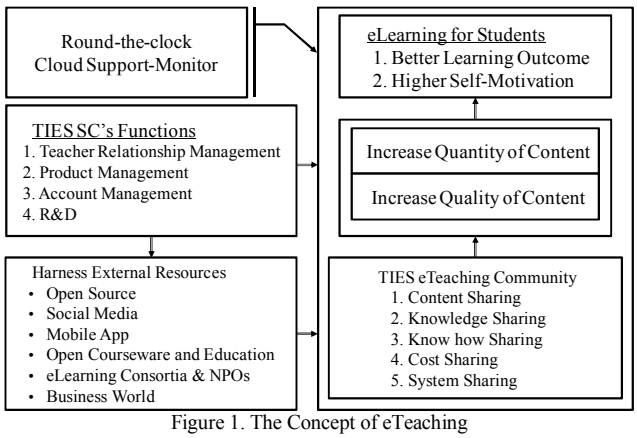


Figure 1. The Concept of eTeaching

 ISBN: 978-1-61208-202-8

TABLE I. THE RECENT GROWTH OF TIES COMMUNITY

Year	2006	2007	2008	2009	2010	2011Feb.
Institutional Users	51	66	73	74	78	83
Instructors	320	801	907	1,021	1,099	1,271
Students	15,099	32,935	46,667	51,783	60,065	70,359
Lectures	548	817	1,053	1,345	1,582	1,810
Video Lectures	660	1,879	3,212	6,181	8,470	11,040
Sharable Content	9,861	15,429	20,801	27,052	33,258	39,417
Lectures Open to the Public	134	186	228	254	258	267

Fig. 2 shows a snapshot of TIES unique interface, where an instructor can have a bird's-eye view of her syllabus, and flexibly create each lesson by selecting and arranging icons according to her own instructional design. She can use all the basic eLearning functionalities such as report and quiz systems, video editor, mobile learning, as well as a Web conference and lecture recording system, ePortfolio and eAssessment systems. Its design also reflects the cultural preference of the Japanese students' love of "cuteness" [2].

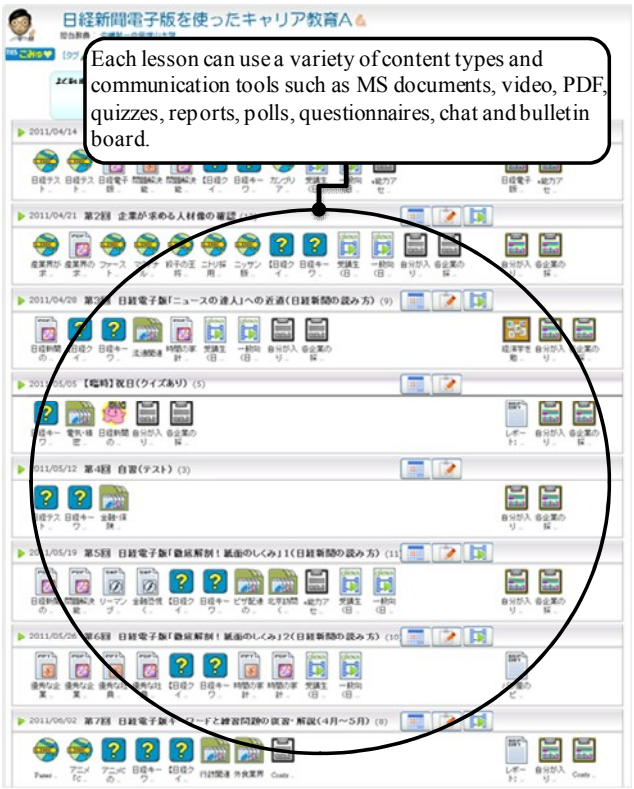


Figure 2. TIES User Interface

III. TIES ASSESSMENT SYSTEM AND FD

In Japan we face the fundamental challenge of how to motivate students to learn more willingly and effectively, and also make them engage in learning more proactively.

The development of TIES eAssessment system is a part of our efforts to solve the issue. The eAssessment project started in 2008 with a premise that our conventional grading system may be overly focused on academic skills, and that a new assessment system is needed to augment the current system by evaluating a student more as a whole-person [3].

The goal of this new assessment is to encourage students to understand their personal strengths and weaknesses, and to reflect on their social skills and self-review their intellectual growth. After two years of intensive discussion involved by every department at Tezukayama University, we have laid out three basic evaluation criteria as follows: (1) academic attributes, (2) personal qualities, and (3) social skills.

Based on the three criteria, we have identified basic attributes and skills necessary for all students to acquire as well as those specific to their academic majors. For example, academic attributes include abilities such as problem finding and solving, logical and critical thinking. Personal qualities include business manners, aptitude of empathy, and venture spirit, among others. Social skills cover abilities to negotiate and communicate with others as well as the capacity to cope with stress, for example. Instructors are then advised to specify in the syllabus which skills and attributes are related to the course objectives for students to learn.

The eAssessment system is made of a four-step process. In the first step, at the beginning of the course, each student is asked to rank listed attributes and skills according to his or her priority of importance. The second step takes place at the end of the semester, where the student again evaluates the criteria in order of importance to see if there is any change of order after taking the course. The third process is for each student to self-evaluate his progress of attainment on each criterion according to (1) significantly acquired more than before (select A), (2) acquired more than before (select B), and (3) unchanged (select C). That is, if a student thinks he has acquired the required attributes and skills significantly more (more or unchanged) after taking the course than before the course, he selects A (B, C) in the system, respectively. In the final step, the instructor evaluates the progress of the student same way by observing the difference of the student's attainment of each criterion before the course and after the course.

Fig. 3 illustrates the final outcome, and it appears in the student's ePortfolio with a summary and radar chart. Table II is an example of the class data that help an instructor to grasp how students changed their attribute priorities before and after the course. We often observe that students tend to mark A's to the highest order of attributes. Table II can also help us to identify a student who tends to select C's regardless of his order of importance, and receive poor final grades often due to his low self-esteem and lack of self-confidence.

Evaluating students from a wide spectrum of academic attributes, personality development and social skills, thus, has many implications on FD. First, each instructor has to

 ISBN: 978-1-61208-202-8

pay more attention to each student as an individual with vast potentials and abilities, and recognize him or her as "a whole person". Next, it requires an instructor to be aware of how her course is related to the educational mission of the university, and of its relevance to her department curriculum, when she prepares her syllabus. Furthermore, she needs to focus more sharply on the objectives of her teaching context and related assignments in terms of the attributes that she expects her students to learn and acquire. Last but not least, she has to assume additional responsibility for her students' personal development as well as their academic performance.

Though it requires more time and duty for an instructor to work on, this eAssessment system assists her to establish a close relationship with her students by understanding them better. We believe that this understanding of a student as a whole person will empower an instructor to influence and motivate her students to learn more effectively for better learning outcome.

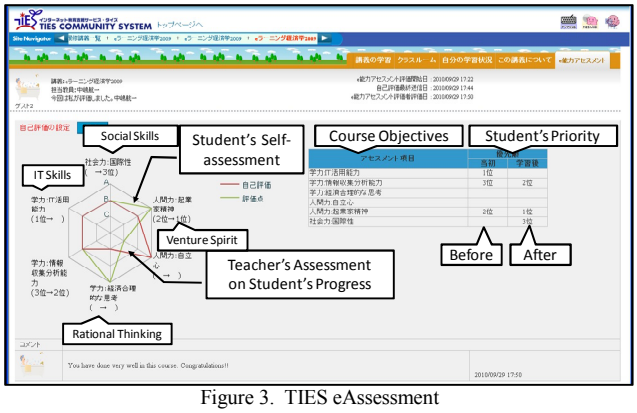
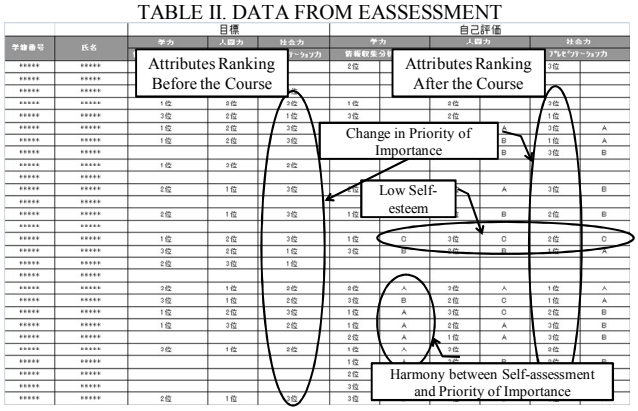


Figure 3. TIES eAssessment

TABLE II. DATA FROM EASSESSMENT



IV. LPEC QUESTIONNAIR AND FD

In order to complement the eAssessment, we have also investigated the potential impact of different teaching styles on students' learning motivation and performance. As a result, we have developed a questionnaire called LPEC to assess students' learning performance by identifying their preferences for teaching and class management styles, and tested its validity since 2005. The questionnaire consists of two sets of questions, asking students what kind of class management and teaching styles they like and dislike. Each student selects 8 out of a first set of 24 styles of class management and teaching styles that he likes, and another 8 out of a second set of 24 styles that he dislikes.

Then each one of those 8 selected answers per set of question is classified to four criteria of logic (L), plan (P), emotion (E) and creativity (C). Finally, they are combined to yield the average class distribution of LPEC preferences.

Questions to identify a student's preference for L are like "teaching style based on logic, fact and evidence", while "teaching style emphasizing creativity and new knowledge, a big picture and holistic approach" are categorized as a preference for C. Similarly, keywords such as "a step-by-step learning", "concrete and procedural", "teaching with a clear answer" are considered to belong to P, while keywords like "group work", "role playing", "student empowerment" are considered to show students' preference for E.

In this research area, the seminal work has been done by Felder and others [4][5]. They categorize students into four main learning styles as (1) active vs. reflective learners, (2) sensing vs. intuitive learners, (3) visual vs. verbal learners, and (4) sequential vs. global learners. In order to identify students' learning categories, they have created an Index of Learning Styles Questionnaire (ILSQ in short). ILSQ is made of 44 binary questions, asking a student to answer the questions like "I find it easier" with (a) to learn facts, or (b) to learn concepts [6].

In addition to ILSQ, Glynn et al. propose the Science Motivation Questionnaire (SMQ in short) to use five factors that may influence a student's learning performance. Those five factors are (1) intrinsic motivation and personal relevance, (2) self-efficacy and assessment anxiety, (3) self-determination, (4) career motivation, and (5) grade motivation [7].

Our LPEC differs from ILSQ or SMQ first that the LPEC is trying to identify a student's learning preferences by asking his preferences for teaching and class management styles. This approach is based on our casual observation that students in Japan seem to have stronger opinions on our teaching styles and class management rather than their own learning styles. This may be due to the fact that most of the students in Japan have to adapt their learning styles to their instructors' teaching styles.

Second, we also observe that students seem to know their likes and dislikes better than whether they are sensory or intuitive, and that students do not necessarily understand their motivation as assumed by ILSQ or SMQ. Third, since students often feel lazy to answer many questions in a questionnaire, we have avoided asking them complicated or confusing questions that lose their interests. Last but not least, some of our questions in LPEC reflect Japanese cultural values that may not be covered by ILSQ or SMQ.

While the use of our questionnaire to identify student preferences is valid or not calls for more research, we like to present some data and attempt to interpret preliminary results. Fig. 4 shows the fixed-point observation of the LPEC of the 2011 course called eLearning Economics, which teaches a wide range of topics from economics, finance, and IT.

 ISBN: 978-1-61208-202-8

As for the eAssessment, we have selected six attributes for the course: they are abilities to (1) find appropriate questions, (2) solve questions, (3) collect and analyze data, (4) take actions, (5) apply rational thinking of economics, and (6) pay attention to the global business trends.

The data is collected at the beginning of the course (Apr.15), at the midterm (Oct.14) and at the end of the course (Jan.27). The sample sizes of students answering the questionnaires are 37, 32, and 32, respectively. Most of them are sophomore and junior students.

Though this course is offered as one-year course, we announced at the end of the first half of the course before the summer vacation that we would change the teaching style radically from one-way teaching by an instructor to team learning and students' engagement and empowerment.

Fig. 4 shows a marked shift of students' preference from P to E in the second half of the course. The P type of teaching is a traditional teaching method of deduction, while E is characterized by the keywords like team work, friendly class atmosphere, communication and collaboration.

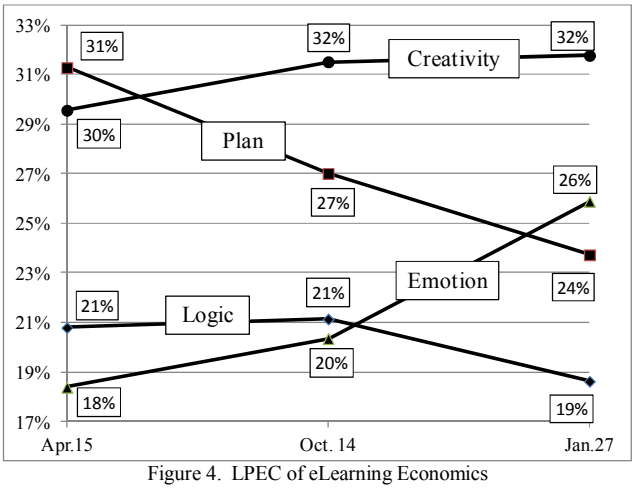


Figure 4. LPEC of eLearning Economics

In addition to the shift of the students' preferences from P to E, data of self-assessment results like Table II provided by students of the class clearly suggest that they are more confident of their learning performance, and that they think they have learned many of the assessment objectives more than they started the course. And unlike a case highlighted in Table II, there was no student marking all C's in this class.

Then, we made more direct question asking the students which teaching style of the semester, first or second, they preferred. The response is that 76% of the students preferred the second semester while the rest liked the first semester. Comments from students indicate that they think they learned more deeply and acquired assessment objectives better in the second semester than the first. Many of them used the phrase like "my learning style harmonizes better with the teaching style of the second semester than that of the first". Thus, we conclude that the class distribution of LPEC can be significantly influenced if an instructor can prepare an appropriate instructional design to align with students' tacit learning preferences.

This result sharply contrasts with the class distribution of LPEC obtained from Development Economics taught in the same year as seen in Fig. 5, where the class size is 28. We did not change the original teaching style of the class, and Fig. 5 suggests that students did not change their learning preferences, either. Thus, the LPEC distribution is fairly stable throughout a year unless the instructor deliberately changes the "rule of the game".

Next, if such a conspicuous shift of the LPEC distribution seen in Fig. 4 frequently occurs or not, we have checked all the available LPEC data of the past eLearning Economics, and summarized them in Table III, where S is a class size.

Unlike the case of 2010 in Fig. 4, it is clear from Table III that none of the LPEC numbers taken from the past four years of the eLearning Economics changed abruptly. Likewise, we have checked the available past data of LPEC of Development Economics and found that they are fairly stable as seen in Table IV.

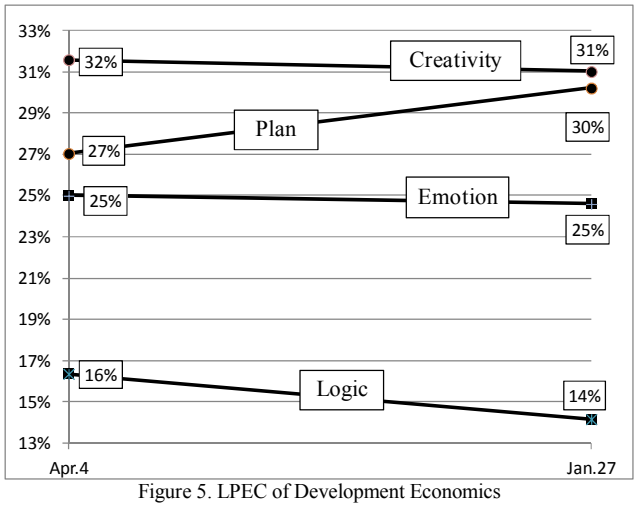


Figure 5. LPEC of Development Economics

TABLE III. LPEC OF ELEARNING ECONOMICS: 2006 - 2009

	2006		2007	
	2006 Apr.14	2007Jan.12	2007Apr.20	2008Jan.25
L	19%	23%	21%	25%
P	29%	25%	27%	28%
E	18%	20%	22%	21%
C	34%	32%	30%	26%
S	115	60	45	26

	2008		2009	
	2008Apr.18	2008Jul.25	2009Apr.10	2010Jan.29
L	22%	22%	21%	23%
P	27%	29%	29%	27%
E	20%	20%	20%	23%
C	31%	29%	29%	28%
S	44	40	40	33

 ISBN: 978-1-61208-202-8

TABLE IV. LPEC OF DEVELOPMENT ECONOMICS: 2007-2009

	2007		2008		2009
	2007 Apr.13	2007 Jul.13	2008 Apr.8	2008 Jul.22	2009 Apr.10
L	21%	21%	19%	18%	18%
P	23%	21%	29%	26%	27%
E	24%	29%	21%	24%	22%
C	32%	29%	31%	33%	32%
S	22	19	27	23	36

With a caveat that the LPEC questionnaire may not be valid, these preliminary LPEC course results appear to suggest the followings: (1) students have tacit preferences for teaching style of the class, (2) these preferences are fairly stable and robust regardless of course characteristics, topics, and content, but (3) appropriate instructional design may be able to alter these preferences considerably.

An immediate implication of these results to FD is that an instructor can accommodate students' learning preferences and their assessment priority by adapting her teaching and class management styles to students' preferences. Without this learning-teaching alignment, both students and an instructor may get frustrated with each other, and students' learning may deteriorate as time passes.

More importantly, if an instructor can design her lecture style appropriately based on the LPEC data, she can manage her class more easily and expect better learning outcomes of students. For example, if the instructor wants her students to acquire logical thinking as one of the assessment objectives, she can use L type of teaching style to change and direct students' preferences more toward logic oriented content and context.

V. CONCLUSION

In Japan we face the urgent issue of implementing a more comprehensive evaluation management system, and creating a spontaneous and self-disciplined learning culture among students.

To solve the problem, we have developed a whole-person approach to assess students from unconventional metrics of academic attributes, personal qualities, and social skills.

To complement the eAssessment, we have also done research on relationship between learning styles of students and teaching styles of instructors, and have developed the questionnaire called LPEC to approximate students' learning preferences via their preferences for class management and teaching styles. This questionnaire is intended to augment the eAssessment system by assisting an instructor to align her teaching style with students' assessment priority and preferred styles of learning.

We have presented preliminary results based on the data obtained from two courses, indicating some usefulness of the approach. However, eAssessment objectives are neither defined precisely to stand a rigorous scrutiny, nor applied unexceptionally. Likewise, the LPEC questionnaire may not truly reflect unobservable nature and preference of students. Furthermore, we need to know how to teach students those attributes in practice. That is, how can we teach a student, say, entrepreneurial spirit, which is not observable? And how can we be sure that the student indeed acquires such a spirit after the course?

One way to approach the problem is to use the data from the student's self-evaluation of the entrepreneurial spirit as a dependent variable, and test its correlation with the LPEC distribution data to find out which style of teaching has a statistically significant coefficient. That is, given that the student's self-evaluation is correct, we can identify which teaching styles influence the student's success of acquiring the qualitative concept of entrepreneurial spirit.

Nonetheless, it seems safe to assume that students appear to have preferred styles of class teaching, and that they seem to be fairly stable, maybe due to their past learning practice. However, our small experiment suggests that a change of instructional method and goal can drastically change their preferences for better learning outcomes. Thus, while we admit that the eAssessment with LPEC questionnaire is only an approximation of the student's unobservable abilities and traits, we conclude that further research is worth pursuing.

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 ISBN: 978-1-61208-202-8