

**Online Bridging Program Development As  
Student Support Services at  
Mathematics Study Program of Universitas Terbuka Indonesia (UTI)**

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**Abstract**

This article is a concept paper about development of a bridging course as student support services, especially for the new students at sophomore and freshman levels who are prone to dropout in distance learning system like Universitas Terbuka Indonesia (UTI). Data show that for every cohort of students enrolls in the Mathematics study program, 50% will not reenroll in the second semester. Researches reveal that the no enrolling students states that they feel they do not have necessary prerequisite skills to survive in the Mathematics study program. UTI applies open enrollment (without entrant examination) and open registration for all of the diploma and undergraduate degree programs. The university, through each study program, provides various support services for the students. With the advancement of information and communication technologies, most of those academic or administrative services can be accessed through the university website and most are open educational resources that can be accessed by anyone, anywhere, and anytime. What are the prerequisite skills needed to survive the Mathematics study program, and how those skills can be developed through a bridging course that can be accessed anytime and anywhere, and what program development model that can be utilized for the development of the course, will be explained in the article. This article is a preliminary literature review for the design and development of the bridging course to be offered through the MOOC platform as an open course in 2017.

Keyword: prerequisite Mathematics skills, distance learning, development model, bridging course

**INTRODUCTION**

UTI applies open enrollment without any entrant examination or diagnostic help for all the study programs available. It assumed that students who are interested to study at a distance learning system like UTI already have the prerequisite skills demanded by the program they choose, since most of them are adults. UTI only requires the high school diploma for any students who enroll in the undergraduate programs. Apparently for the Mathematics study programs, not all students have the necessary prerequisite mathematics skills that they should have when they graduated from high school. This situation is experienced both by the fresh high

school graduates or the adult learners who graduated few years before they apply as UTI's students. UTI also participates in the National University Entrant Examination since 2012 to attract students just graduated from high school by offering them scholarship to study at UTI. However, UTI still experienced high dropout as described in Table 1, from 145 new students registered in the second semester of 2010 (2010.2) only 13 still register in the second semester of 2014 (2014.2).

**Table 1: Data of Mathematics' Students per Cohort, 2009.1 – 2014.2**

Jenjang		MRI	20091	20092	20101	20102	20111	20112	20121	20122	20131	20132	20141	20142
C	S-1	20091	72	31	22	14	12	10	7	6	5	5	4	4
C	S-1	20092	0	132	61	41	29	21	21	14	11	14	10	9
C	S-1	20101	0	0	78	36	75	29	18	24	20	15	9	7
C	S-1	20102	0	0	0	145	79	50	52	33	32	23	21	13
C	S-1	20111	0	0	0	0	61	27	15	13	6	7	6	3
C	S-1	20112	0	0	0	0	0	144	84	57	34	33	25	24
C	S-1	20121	0	0	0	0	0	0	70	32	18	17	9	7
C	S-1	20122	0	0	0	0	0	0	0	133	77	50	36	28
C	S-1	20131	0	0	0	0	0	0	0	0	76	49	26	17
C	S-1	20132	0	0	0	0	0	0	0	0	0	125	78	51
C	S-1	20141	0	0	0	0	0	0	0	0	0	0	75	39
C	S-1	20142	0	0	0	0	0	0	0	0	0	0	0	120

**Note: Jenjang = Degree; S-1: Bachelor Degree**

Preliminary qualitative study conducted on the non-active students who did not register for the past 4 semesters consecutively, revealed that all of them stated that Mathematics is difficult and their grades in the first and second semester for the Mathematic course are D or less (Pramono Sidi, Abzeni, Dina Mustafa, 2015). This is also the statement of active students, albeit they still register as students in the program. The Mathematic courses in the first and second semester should be able to develop the necessary basic skills the students need to survive the program. In the first semester students have to take Introductory Mathematics, Introductory Calculus, and Elementary Linier Algebra. However, since most high school graduate only develop the arithmetic ability and not the logic ability, so they encounter difficulties even in the

first and second semester mathematics courses that demanded the logic ability. On top of lack of mathematics prerequisite skills, the new students also lack of skills to survive in distance learning situation, such as self-regulated, reading for learning (since all courses in UTI have print modules as the main learning materials), and study skills. For these skills UTI already has open educational resources that can be accessed by students through UTI website ([www.ut.ac.id](http://www.ut.ac.id)). All tutors at UTI are expected to direct new students to access the website to develop their self-regulated learning skills appropriate for the UTI system.

There are no bridging courses that address the lack of basic skills in subject area such as Indonesian and English language, Mathematics (for Mathematics, Natural Sciences, and Social Sciences Major), Physics, and Chemistry. UTI is developing four basic non-credit bridging courses, Communicative English, Entrepreneurship, Self-regulated Learning Skills Development, and Information Communication and Technology Skills Development to be offered at 2017.

To develop the bridging course for diagnostic and development of the Mathematics prerequisite skills this research and development study will aim at:

- Identifying the entry behavior skills to be able to survive as the mathematics major in UTI system.
- Developing diagnostic test to access the entry behavior skills of the new students.
- Identifying the available educational resources, open or otherwise, that can be integrated into the bridging course.
- Planning and developing the bridging course.
- Evaluating the bridging course by experts and small number of students.
- Implementing the bridging course in 2017.

- Evaluating, revising, and offering the bridging course as MOOC (2017).

## **Literature Review**

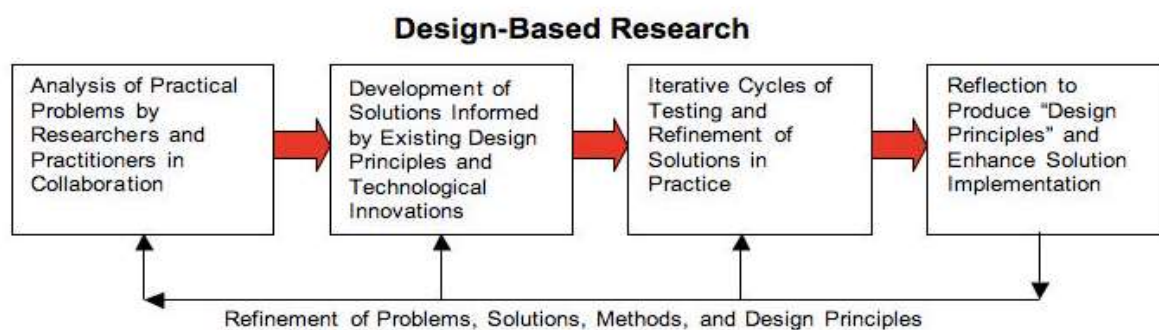
*A bridging or developmental or remedial educational program* is intended to help students who lack necessary entry behavior skills to survive educational program they want to major, such as the Bachelor Mathematics Program at UTI. A bridging program should be designed as such that it can help students at various level of development to improve their learning abilities, and should include general academic abilities, such as reading, writing, study skills, self-regulating learning, and subject matter specific prerequisite skills (Kozeracki, 2002). Furthermore, an online bridging program should consider providing support for student learning process such as facilities for collaborative dialogue and small group work for task completion, to respect students as distance independent learners (Brants & Struyven, 2009). Debande (2004) suggests the following to be provided by an educational institution that would like to offer an online bridging program. The educational institution should ensure the availability of infrastructure, equipment, and services to ensure that the program can be delivered to and be accessed by the target students very well. Data about the program can be generated easily for monitoring, evaluating and improving the program, as well as to study the efficiency and the effectiveness of the program. Last but not least, the training or mentoring services for the teachers or the tutors of the online bridging program are available.

The bridging program will be in MOOC form, based on MOODLE platform that already utilized at UTI, integrating the necessary general study skills that already available in the UTI websites and specific entry behavior of Mathematics skills. In Indonesia, the high school mathematics curriculum give competencies mostly in counting and less in logic, while in university level Mathematics students are asked to do a lot of validating a situation utilizing

logical mathematics reasoning. Most universities in Indonesia required new students to take bridging program in their freshman year. The bridging program ensures that the students have the entry behavior skills that they should have after graduating high school. Most Indonesian students find the university mathematics much more different than what they studied at high school. UTI applies open enrollment for the diploma or bachelor degree students. There are OER programs that inform students about general study skills and study skills specific for distance learning system at UTI website.

## METHODOLOGY

The design and development of the online bridging program will utilize the research and development model or design-based research as describe by Picture 1 (Amyl and Reeves, 2008).



**Picture 1: Steps in Design-based Research**

Design-based research was claimed to help educational researchers to conduct systematic and collaborative study that can yield research product that can solve practical educational problems utilizing the appropriate combination of technology, pedagogy, and educational content. The approach necessitates the close collaborative activities among the researcher, practitioners, and decision makers of the educational institution, in identifying practical problems, developing research questions, and designing appropriate learning environment to address the problem.

The first step in the design-based research is analysis of practical problem by the researcher and practitioner in collaboration, already done to write the research proposal for funding by UTI. The researcher works together with the faculty members and the head of Mathematics study program to analyze the problems of high stop-out of new students at the second semester. Since the research is at the proposal stage, albeit have been approved to be funded, but the development of the plan is still at the early stage. The study will also involve mathematics teachers at university or schools that familiar with the Mathematics entry behavior of high school graduate. They will be involved to develop the diagnostic mathematics test and the bridging program to address the result of the diagnostic test. Furthermore the researcher will work with the media specialist to design and fine tune the platform and the content appearance of the bridging program.

The second step is developing the solution based on the existing design principles and technology already employed by UTI. In this case the solution is the online mathematics bridging program on the MOODLE platform in the form of MOOC. The researcher already advised by the proposal reviewers about the OERs, the logical mathematical exercises that can be utilized as part of the bridging program, and consideration to limit the program to the new students of the Mathematics study program.

The MOOC will be developed and reviewed by the experts in mathematics subject matter and educators by November 2016, the first activity in the third step of the design-based research. Most of the third and the entire fourth step will be conducted in 2017. Data will be analyzed using qualitative approach at the first and second step of the approach, and quantitative approach to determine the effectiveness of the online bridging program at the third and the fourth step of the design-based research approach.

## **RESULTS**

The results of the research are instrument for diagnosing the entry behavior mathematics skills of students and the Online bridging program that adaptive to the result of the diagnostic test of students. The online bridging program will be available for they who already registered as UTI students.

## **CONCLUSION**

The article is a concept paper of a development study utilizing the design-based research approach. The result of the study is a diagnostic mathematics entry behavior skill for new students at the mathematics study program of UTI and the online bridging program to address the lack of necessary entry behavior mathematics skills. The study will take two years to develop. And will be the collaborative results of researchers, practioners in Mathematics subject matter and educators, and educational technologist.

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