

## ABSTRACT

**Yarman.** 2021. Development of Local Instructional Theory for Ordinary Differential Equations Course. *Dissertation*. Post Graduate Program of Universitas Negeri Padang.

Ordinary Differential Equation (ODE) is a compulsory subject in the Mathematics Department in Higher Education in Indonesia. One of the materials in this ODE course is the first-order Ordinary Differential Equations. The results of the initial research show that there is a tendency for learning on the topic of first-order ODE to prioritize theoretical studies over applied materials. As a result, students' mathematical communication skills are less developed in this topic. Therefore, it is necessary to develop Local Instructional Theory (LIT) based on Realistic Mathematics Education (RME) for the topic of order-1 ODE. The LIT development process uses the Plomp development model design research which is complemented by the Gravemeijer & Cobb model. The Plomp model consists of three main phases, namely (1) preliminary research phase; (2) development or prototyping phase which includes several formative evaluations, namely self evaluation, expert review, one to one evaluation, and small group; and (3) an assessment phase in the form of a field test. The Gravemeijer & Cobb model is utilized in the development phase. This model also consists of three phases, namely (1) preparing for the experiment phase; (2) conducting of the experiment phase; and (3) retrospective analysis phase. As research subjects in this study were students of the Mathematics Education Study Program, FMIPA Universitas Negeri Padang. The research data were collected using document analysis techniques, interviews, observations, questionnaires, and tests. The results of this study are RME-based LIT for the topic of order-1 ODE which is implemented in the form of a Lecturer Work Guidebook and Student Activity Guidebook which are (1) valid, with characteristics according to needs, utilizing the correct first-order ODE concept, the components of learning design are interrelated with each other in a manner consistent, and the learning design contains HLT components and meets the RME characteristics; (2) practical, with the characteristics of usability, easy to use, and has excellent traction; and (3) effective, that the developed LIT has an impact on improving students' mathematical communication skills.

## ABSTRAK

**Yarman.** 2021. Pengembangan *Local Instructional Theory* untuk Perkuliahan Persamaan Diferensial Biasa. Disertasi. Pascasarjana Universitas Negeri Padang.

Persamaan Diferensial Biasa (PDB) merupakan mata kuliah wajib pada Jurusan Matematika di Perguruan Tinggi Indonesia. Salah satu materi dari mata kuliah PDB ini adalah Persamaan Diferensial Biasa Orde-1. Dari penelitian awal diperoleh terlihat adanya kecenderungan pembelajaran topik PDB orde-1 lebih mengutamakan kajian teoritis dari pada materi terapan. Akibatnya kemampuan komunikasi matematis mahasiswa menjadi kurang berkembang dalam topik ini. Oleh karena itu, perlu dikembangkan *Local Instructional Theory* (LIT) berbasis *Realistic Mathematics Education* (RME) untuk topik PDB orde-1. Proses pengembangan LIT ini menggunakan *design research* model pengembangan Plomp yang dilengkapi dengan model Gravemeijer & Cobb. Model Plomp terdiri dari tiga fase utama, yaitu (1) *preliminary research phase*; (2) *development or prototyping phase* yang mencakup beberapa evaluasi formatif, yaitu *self evaluation*, *expert review*, *one to one evaluation*, dan *small group*; dan (3) *assessment phase* berupa *field test*. Model Gravemeijer & Cobb dimanfaatkan pada fase pengembangan. Model ini juga terdiri dari tiga fase, yaitu (1) *preparing for the experiment phase*; (2) *conducting of the experiment phase*; dan (3) *retrospective analysis phase*. Sebagai subjek penelitian dalam penelitian ini adalah mahasiswa Program Studi Pendidikan Matematika FMIPA Universitas Negeri Padang. Data penelitian dikumpulkan dengan teknik analisis dokumen, wawancara, observasi, penyebaran angket, dan tes. Hasil dari penelitian ini berupa LIT berbasis RME untuk topik PDB orde-1 yang diimplementasikan berupa Buku Panduan Kerja Dosen dan Buku Panduan Kegiatan Mahasiswa yang (1) valid, dengan karakteristik sesuai kebutuhan, memanfaatkan konsep PDB orde-1 yang benar, komponen-komponen desain pembelajaran saling terkait secara konsisten, dan desain pembelajaran memuat komponen HLT serta memenuhi karakteristik RME; (2) praktis, dengan karakteristik dapat digunakan, mudah digunakan, dan memiliki daya tarik yang sangat baik; dan (3) efektif, dimana penerapan LIT yang dikembangkan berdampak terhadap peningkatan kemampuan komunikasi matematis mahasiswa.