

# GEOWAPP: A GEOSPATIAL WEB APPLICATION FOR LAB EXERCISES IN SURVEYING

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*E-learning applications that allow students to review their survey data are not widely used in surveying Engineering. To design and develop such an application, the requirements to be studied include user interactions, technology interactions, existing exercises, data representation, etc. This study comprises the process of designing, developing, and testing a geospatial web application (GEOWAPP), which is intended to be under the adjunct mode of e-learning. Four exercises were supported by GEOWAPP: two levelling exercises, a traversing and a topographic survey exercise. The GEOWAPP contains five tools: Traversing Comparator, Differential Levelling Comparator, Least Squares Levelling Tool, Vertical Comparator, and Proximity Comparator. After testing using surveying real data and book exercise data, the GEOWAPP functionality was found operational. Finally, user reviews were favourable towards the GEOWAPP. This application provides a new way to support surveying exercise lab practices by delivering immediate feedback.*

*Les applications d'apprentissage en ligne qui permettent aux étudiants d'examiner leurs données de levés sont peu utilisées en génie de l'arpentage. Pour concevoir et développer de telles applications, les exigences à étudier comprennent les interactions avec les utilisateurs, les interactions avec la technologie, les exercices existants, la représentation des données, etc. Le présent article comprend le processus utilisé pour la conception, le développement et la vérification d'une application Web géospatiale (GEOWAPP) qui est destinée à être en mode complémentaire à l'apprentissage en ligne. Quatre (4) exercices ont été soutenus par GEOWAPP : deux (2) exercices de nivellement, un exercice de polygonation et un exercice de levé topographique. GEOWAPP contient cinq (5) outils : un comparateur de polygonation, un comparateur de nivellement différentiel, un outil de nivellement par moindres carrés, un comparateur vertical et un comparateur de proximité. Après une vérification en utilisant les données réelles des levés et les données du manuel d'exercice, la fonctionnalité GEOWAPP s'est avérée opérationnelle. Finalement, les commentaires des utilisateurs sont favorables à l'endroit de GEOWAPP. Cette application offre une nouvelle façon de soutenir les laboratoires pratiques d'arpentage en donnant une réaction immédiate.*



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## 1. Introduction

The availability of Internet resources has opened new opportunities for interactive ways of teaching. For instance, online academies exist (e.g., Khan Academy) and universities (e.g., Curtin University, Australia) that offer training in areas such as English, business, database management, web development and others; Stanford University offers MOOCs (Massive Online Open Courses). This trend suggests looking for new interactive ways to apply e-learning in other areas. Commonly, universities use learning management systems (LMS) to deliver content such as handouts, instructions and extra resources. For instance, the D2L (Desire to Learn) LMS is used at the University of

New Brunswick (UNB). LMSs are developed to provide services to all areas of study. Because of this generalization, there are specialized practices that are not supported in some areas, such as surveying engineering. In these practices, surveying students often fail the requirement set by instructors. This failure is caused by student inexperience in analyzing the data. Also, students may not know that their computations or measurements are wrong until they deliver the assignment. These situations can be improved by developing a web application that validates student data.

This study comprises the process of designing, developing and testing a geospatial web application