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Design Steps for Physics Stem Education Learning Activity in Secondary Education

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This research aimed to provide solutions for secondary school teachers on physics who were incapable of designing decent stem education for their own learning activity contexts, and experts did not agree that it did not conform to the concept of STEM Education. It was, then, to develop steps on physics STEM Education learning system activity in secondary school education for further application.

Design steps were as follows 1. Study on research and other relevant literature reviews 2. Interview the 5 targeted instructors and experts on physics teaching and STEM Education 3. Design steps and have examination and assessment by experts for further improvement 4. Have 7 instructors design stem education learning following the steps and make teaching test on their own students.

During this moment, researcher teams were collecting data to analyze and effectively improve the design steps.

The result contributed to an emergence of 5 steps which are 1. Study on an origin, meaning, and objectives of STEM Education 2. Study and comprehend engineering design process 3. Study of STEM Education lesson features 4. Design STEM Education learning activity comprising of problematic situation prescription, objective setup, knowledge setup to allow learners to design solution methods that integrate scientific, mathematic, and technological knowledge, as well as prescription on feasible solutions based on engineering design principle and lesson plan design 5. Apply designed learning activity to teaching together with assessment and improvement.

The result of having physics teachers to design steps found that the teachers were able to design STEM Education learning activity certified by the experts that it conformed to the concept of stem education and would be more effective if they were under the guidance of engineering experts or the teachers had experience on invention or taught invention projects. Satisfaction assessment result of the teachers to design steps found that it was at "high"level . The results to the learners were that learning achievement, attitudes on physics, and critical thinking skill were significantly higher at .05 and the learners were satisfied to stem education learning activity at high level.

In addition, The results also found that the moment that the teachers did not understand and comprehend engineering design process and STEM Education objectives particularly its application objectives to Thailand was a major cause making the teachers unable to design STEM Education learning activity, One of the reasons causing problems of physics stem education teaching conduct in Thailand.

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