

Methodology of Curriculum Development – Results of the Literature Review

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Abstract. This contribution deals with results of the one and half year long literature review, which was focused on a methodology of physics (or science) curriculum development. An attention was especially paid to international databases Scopus and Web of Science. The literature review has shown, that a common physics curriculum has to (and also had to in the past) face many problems like e.g. math level, “traditionalism” and so on. Unfortunately, methodology mentions of curriculum development are very rare and from the methodological view there is missing a transparency.

1 Introduction

At the Department of Physics Education, Faculty of Mathematics and Physics, Charles University in Prague, there is an effort to create a new physics curriculum for secondary schools in the Czech Republic. This effort relates to the idea to design new physics textbooks for Czech secondary schools.

The origin of the current Czech physics curriculum and of the physics textbooks content is not methodologically transparent. However, there are more reasons for a change. A certain dissatisfaction with the contemporary situation is obvious from opinions of physics teachers and physics education experts. Also, Czech physics curriculum and content of textbooks are very traditional (which is not only a Czech problem – in fact, it is very usual) and this “traditionalism” is criticized also on the international level. So, a literature review is the logical starting point in this effort, but unfortunately it has not had many satisfactory results yet.

2 Literature Review

Between September 2017 and March 2018, the literature review focused on methods, how a new physics (or science) curriculum is usually (or should be) developed, was under way. An attention was paid especially to the international databases Scopus and Web of Science, where the keywords *curriculum*, *development*, *design*, *reform*, *physics*, *science*, *secondary school* and *curriculum-making* were used for searching of relevant publications. During the mentioned time interval, approximately 450 abstracts of founded publications were reviewed and roughly 50 publications were found possibly relevant.

An attention was paid also to books, that relate to curriculum. Especially to books with the phrase *curriculum development* included in their name. But it is usual, that in almost every book, which deals with a research of education, some chapter is dealing with curriculum.

Results of the Literature Review

The reviewing of possibly relevant publications is still in process, but it is possible to show preliminary results here, that are mentioned in reviewed articles and books.

2.1 *Insufficient Attention to a Physics (Science) Curriculum*

Insufficient attention to a physics (science) curriculum is criticized in many founded publications, e.g. [1], p. 31. Moreover, many publications, that deal with curriculum, are undertaken as discrete case studies with no frame of reference, see [2], p. 736.

2.2 *Mathematics as a Constraint in Physics*

Mathematics in physics is an issue since physics appeared at secondary school. It was criticized during all last century (see [3], p. 422 and 423) and it is criticized now (see [1], p. 32), that physics is too mathematical and abstract.

2.3 *Usually Very Traditional Physics Curriculum*

So called *academic curriculum* is the oldest type of curriculum and still commonly used at secondary school science lessons, e.g. see [2], p. 737, [4], p. 359. Also, the content selection of the curriculum is typically guided by habit or tradition, see [1], p. 36.

2.4 *Usual Way of Curriculum Development – Committee with No Transparent Methodology*

The establishment of a committee is an often way, how usually an official curricular reform begins. The problem is, that this committee is usually established by the government, so there is an appreciable political influence (see [2], p. 734 and 735). Moreover, a common practice is, that members of this committee are almost randomly selected and their work is not transparent and without an extensive review or testing (see [2], p. 736 and 737).

2.5 *Importance of All Dimensions of Curriculum – an Example with Organization Dimension in the USA*

When a new curriculum is being developed, it is important to not focus only on one curriculum dimension – e.g. a content dimension. It is also important for what kind of school is the new curriculum meant and how is the school organized (see [2], p. 731 and 733). For example, the organization of science courses in most high schools in the USA is so inauspicious, that physics has become essentially elective subject there (see [3], p. 421).

3 Conclusion

The presented literature review results show, that it is very difficult to find some relevant information about methodology of curriculum development. Methodological information is rare and publications, that are relevant, usually only identify problems of contemporary physics (science) curriculum. The results indicate, that if we want to be transparent in the process of developing new physics curriculum, we have to design our own methodology.

References

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