Interactive applets in Moodle using JSXGraph

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Presentation outline

1. JSXGraph library
2. JSXGraph Moodle plugin
3. JSXGraph book
4. JSXGraph in Moodle as a tool for visualizing constructions
5. ITEMS Project
6. JSXGraph and Moodle Formulas plugin
7. JSXGraph and Stack plugin, Abacus consortium
8. JSXGraph Conference in 2020
JSXGraph library

Interactive geometry, plotting, visualization

JSXGraph is a cross-browser JavaScript library for interactive geometry, function plotting, charting, and data visualization in the web browser.

Cubic spline interpolation

Constructs a cubic spline through given points. Points can be added by clicking on "Add point".

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```javascript
var board = JXG.JSXGraph.initBoard('box', {boundingbox: [-5, 10, 7, -5], axis: true});

var p = [];
p[0] = board.create('point', [-1,2], {size: 4, face: 'o'});
p[1] = board.create('point', [0,-1], {size: 4, face: 'o'});
p[2] = board.create('point', [1,0], {size: 4, face: 'o'});
p[3] = board.create('point', [2,1], {size: 4, face: 'o'});

var c = board.create('spline', p, {strokeWidth: 3});

var g = board.create('glider', [1.5,0,0], {name: '', style: 8});

var t = board.create('tangent', [g], {dash: 2, strokeColor: '#aa0000'});

function addPoint() {
  p.push(board.create('point', [(Math.random()-0.5)*10,(Math.random()-0.5)*3],{size: 4, face: 'o'}));
  board.update();
}
```
JSXGraph Moodle plugin

- [https://moodle.org/plugins/filter JSXgraph](https://moodle.org/plugins/filter JSXgraph)
- [https://github.com/jsxgraph/moodle-filter JSXgraph](https://github.com/jsxgraph/moodle-filter JSXgraph)
- Build constructions in Moodle Activities or Moodle Resources

Example:

```html
<jsxgraph width="600" height="500" box="mybox">
    (function() {
        var brd = JXG.JSXGraph.initBoard('mybox', {boundingbox:[-5,5,5,-5], axis:true});
        var p = brd.create('point', [1,2]);
    })();
</jsxgraph>
```
JSXGraph in Moodle as a tool for visualizing constructions

- every JSXGraph construction can be embedded in Moodle
JSXGraph Book

- Introduction to programming with JSXGraph
- https://ipesek.github.io/jsxgraphbook/
- Under active development
- Multilanguage (English, German, Spanish, Czech, Slovene, Finnish, etc)
ITEMS project

www: https://itemspro.eu/

Objectives

- To create ICT STEM-based modules integrating e-assessment tools and assignments
- To research on the use of JSXGraph software
- To monitor the pedagogical effectiveness of materials by means of Learning Analytics tools
- To promote professional development training activities and the mentoring of educators involved.
- To distribute materials created as Open Education Resources (OER) and through MOOCs.

ITEMS moodle

- https://moodle.itemspro.eu/
- accessible also through Google account
- LTI connection possible on the content
- Content (using JSXGraph)
  - Physics
  - Mathematics
  - Science
JSXGraph and Moodle Formulas question type plugin

- JSXGraph interacts with Moodle Formulas question type
  (https://moodleformulas.org/)
- introducing randomization in the questions
- saves user interaction
The STACK question type adds a sophisticated assessment in mathematics and related disciplines, with emphasis on formative assessment underpinned by computer algebra.

www: https://moodle.org/plugins/qtype_stack

Abacus is a material bank for STEM education based at Aalto University, Finland. We seek to produce, share and host high-quality educational material between collaborators.

www: https://abacus.aalto.fi

More than 9000 problems, 7000 of them as STACK questions.
- Aalto University => more than 200k STACK questions answered,
- Open University (UK) => 500k STACK questions answered
Place the vertices of the hexagon so that:
- Three of the angles are either acute or obtuse angles i.e. between 0° and 180°.
- The other three angles are reflex angles i.e. between 180° and 360°.

Note that the hexagon has to be non-self-intersecting!
JSXGraph conference in 2020

**Date:** 8.-9. October 2020  
**Location:** University of Bayreuth, Germany

Topics:
- JSXGraph
- JSXGraph and Moodle

www: [https://jsxgraph.org/conf/](https://jsxgraph.org/conf/)
Questions?