

# Technical Advances and Didactic Reasoning in the Project AuthOMath (2022 – 2024)



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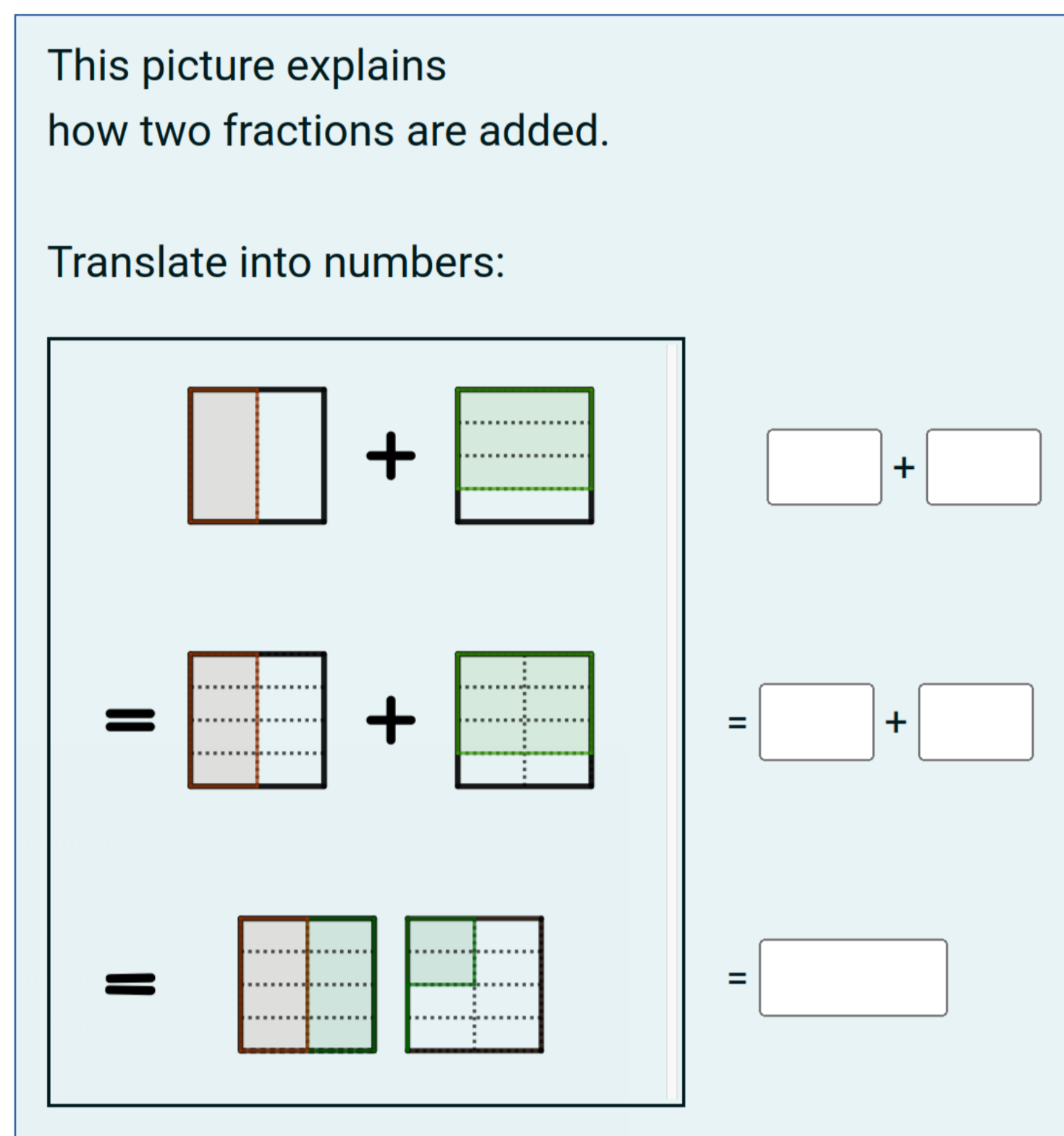
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[www.authomath.org](http://www.authomath.org)

project result 1 **AuTo** a moodle based authoring tool for randomized interactive and dynamic multimodal mathematical tasks with automatic adaptive feedback



STACK question with GeoGebra applet



STACK code for implementing GeoGebra applet

```
n1:rand(2,3,4,5);
n2:rand_with_prohib(2,5,[n1]);
z1:rand(n1-1)+1;
z2:rand(n2-1)+1;

1 <br>This visualization shows<br>how two fractions are added.<br><br>Tr
2 |
3 <table style="border-collapse: collapse; width: 400px; border="0">
4 <tbody>
5 <tr>
6 <td style="width: 180px; vertical-align: bottom; border-sty
7 |
8 [[geogebra set="n1,n2,z1,z2,x1,y1,x2,y2"]
9 params["material_id"] = "yqhjprzc";
10 params["width"] = 450;
11 params["height"] = 550;
12 params["borderColor"] = "rgba(0, 0, 0, 0)";
13 params["transparentGraphics"] = true;
14 params["scale"] = 0.5;
15 [[/geogebra]]
16 |
17 </td>
```

names of variables in applet, with

set: transmit values from STACK to applet  
watch: read values from applet into STACK on "check answer"  
remember: remember values for reloading applet, e.g. in feedback

applet ID on geogebra.org

GeoGebra App Parameters as defined by GeoGebra:  
[https://wiki.geogebra.org/en/Reference:GeoGebra\\_App\\_Parameters](https://wiki.geogebra.org/en/Reference:GeoGebra_App_Parameters)

The authoring tool is an upcoming version of STACK that facilitates the implementation of GeoGebra applets into task and feedback (Lutz 2023)

**Idea** combining strengths and communities of GeoGebra and STACK

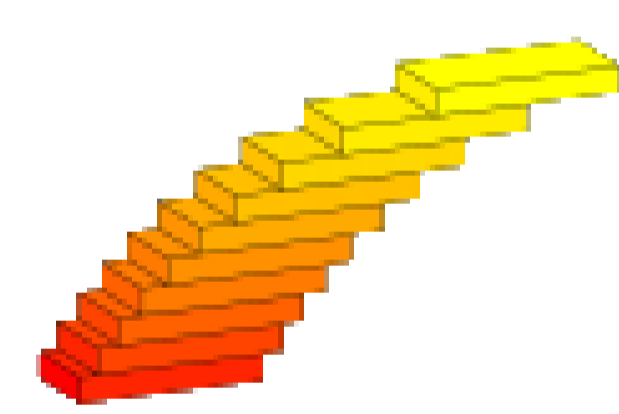
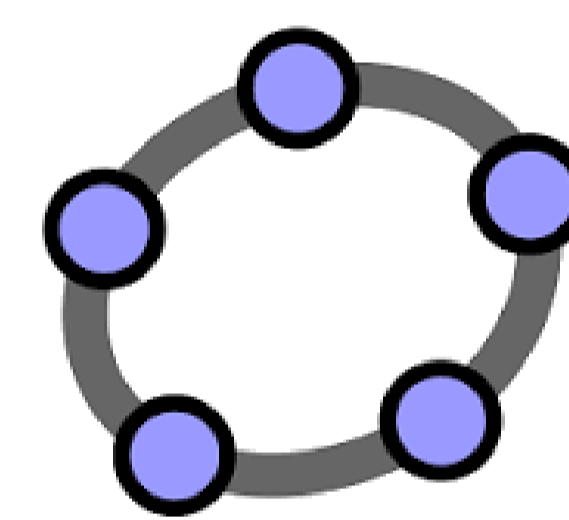
◦ interactivity

◦ dynamization

◦ multimodality

◦ adaptive feedback

◦ randomization



focussing on **variance** in mathematical thinking

- a priori analysis of valid range of values for randomizing real-context problems (Ríos-San-Nicolás et al., 2022)
- a priori analysis of range of possible solving strategies for programming adaptive feedback (Ríos-San-Nicolás et al., 2022)
- a priori analysis of example spaces for programming adaptive task deployment (Kinnear, G. & Foster, C., o.J.)
- a priori analysis of well-known misconceptions and systematic errors for programming adaptive feedback (Pinkernell, 2020)

focussing on **flexibility and activity** in mathematical thinking

- make objects of learning manipulative and explorative with interactive applets in tasks
- activate learning from errors, e.g. with interactive applets in feedback (Pinkernell, 2021)

The didactic concept will take up the necessary didactic reflections that are initiated by the specific affordances of GeoGebra (interactivity dynamization, multimodality) and STACK (adaptive feedback, randomization). It will provide guidelines with concise information for digital tasks design with a sound didactic basis.

From the student teachers' point of view, writing digital tasks with AuTo can therefore be seen as an application and deepening of the didactic knowledge they have acquired during their studies.



a didactic concept for designing online based interactive material for use in teacher education **DiCo** project result 2