**Supplementary table**

*Features of the studies Included in the Systematic Review and Meta-analysis (Outcome, Effect Sizes or Significant Effects are Reported)*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author(s)/year** | **Age/**  **Grade** | **Sample size** | **Intervention type** | **Coding**  **tool** | **Structured/ Unstructured** | **Intervention length** | **Included**  **SR/MA** | **Outcome/**  **Effects sizes** |
| Akcaoglu & Koehler (2014) | Grades 5-8 | 44 | Virtual coding | Game Design and Learning | U | 900 min | SR/MA | Problem-solving (d = 1.05) |
| Arfé et al (2019a) | Grade 1 | 76 | Virtual coding | Code.org | S | 480 min | SR/MA | Inhibition (d= -0.65)  Planning (d=0.95)  Problem-solving (NT, d=1.62) |
| Arfé et al (2019b) | Grade 2 | 38 | Virtual coding | Code.org | S | 480 min | SR/MA | Inhibition (d= -1.05)  Planning (d=0.93)  Problem-solving (NT, d=1.91) |
| Arfé et al (2020) | Grade 1 | 179 | Virtual coding | Code.org | S | 480 min | SR/MA | Inhibition (d= -0.71)  Planning (d= 1.27)  Problem-solving (NT, d=1.31) |
| Brown et al (2008) | Grades 5-6 | 113 | Virtual coding | Scratch | U | 180 min | SR | Problem-solving |
| Çakır et al (2021) | Preschool | 40 | Educational robotics | LEGO WeDo 2.0 | S | 1920 min | SR | Problem-solving |
| Çiftci & Bildiren (2020) | 4-5 years | 28 | Virtual coding | Code.org | S | 60 min | SR | Problem-solving |
| Çınar & Tüzün (2020) \* | Grade 10 | 81 | Educational robotics | LEGO Mindstorms NXT 2.0 | S | -- | SR | Problem-solving |
| Demir (2021)\*\* | Grades 9-11 | 34 | Coding unplugged |  | S | -- | SR | Problem-solving |
| Di Lieto et al (2020a) | Grade 1 | 187 | Educational robotics | Bee Bot | S | 1200 min | SR/MA | Inhibition (d= 0.69)  Working memory (d= 0.65)  Cognitive flexibility n.s. |
| Di Lieto et al (2020b) | Grade 1 | 42 | Educational robotics | Bee Bot | S | 1200 min | SR/MA | Inhibition  Working memory n.s. |
| Erol & Çırak (2022) | Grade 6 | 34 | Virtual coding | Scratch | U | 1680 min | SR/MA | Problem-solving (η2 = 0.262) |
| Lai & Yang (2011) | Grade 5 | 130 | Virtual coding | Scratch | U | -- | SR | Problem-solving |
| La Paglia et al (2017) | Grades 5-6 | 60 | Educational robotics | LEGO Mindstorms | S | 1800 min | SR/MA | Problem-solving |
| Nam et al (2010) | Grade 6 | 60 | Virtual coding | Scratch | U | 480 min | SR/MA | Problem-solving |
| Nam et al (2019) | 5-6 years | 53 | Educational robotics | TurtleBot | S | 720 min | SR/MA | Problem-solving (η2 = 0.17) |
| Oluk & Saltan (2015) | Grade 6 | 65 | Virtual coding | Scratch | U | 720 min | SR | Problem-solving |
| Özcan et al (2021) | Grade 4 | 174 | Virtual coding | Code.org + Scratch | S+U | 1200 min | SR | Fluid intelligence |
| Pardamean et al (2011) | Grade 5 | 85 | Virtual coding | Logo  programming | S | 640 min | SR/MA | Problem-solving  Cognitive flexibility |

*Note*: Effect sizes = Significant major effects; S = Structured; U = unstructured; NT = near transfer effects; n.s. = non-significant; \* the comparison group was active control group (visual programming tool); \*\*both the experimental group and control group were exposed to coding activities.