



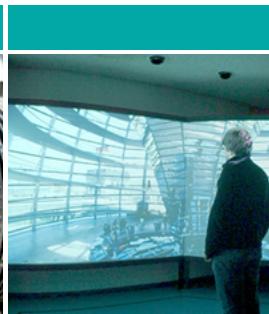
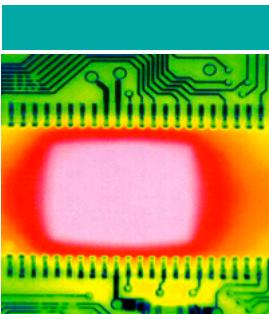
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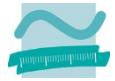
„What do students know, how long does it take them to know? At a Glance for Teachers and Instructional Designers





Co-Authors





- A nice place to live!



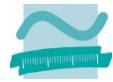
http://awesomeberlin.net/wp-content/uploads/2017/06/wan_n1.jpg

<http://www.iheartberlin.de/berlin-is-on-ice-impressions-of-a-frozen-city/>



- Smart learning project
 - Learning objects, learning unit, course
- Data
- Traffic-Light visualization
- Learning-Time visualization
- Conclusion and future works





- Innovative pedagogical approach proposed for vocational training, applicable in other contexts
 - Digital learning objects: animations, videos, texts, interactive exercises stored in a repository that can be shared between institutions
 - Learning recommendations for students: what should I learn next?
 - Learning analytics for teachers, instructional designers (and students): what is the progress?

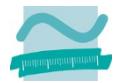


■ Learning Objects, learning units

The screenshot shows a JavaFX application window titled "Fortbildungslehrgang". The window contains a sidebar with icons and a main list area. The list includes:

- Wie viel wissen Sie schon?
- Grundlagen der Ereignisbehandlung und Binding
- Übung: EventHandler
- Properties in JavaFX
- Die Klasse javafx.scene.control.Slider und Maus-Ereignisse
- Übung: Slider
- Menüs
- Übung: Menü
- Das Beispiel "Hotel" in model-view-controller programmiert
- Übung: Hotelbewertung
- Wissensüberprüfung
- Einsendeaufgabe

To the right of the application window, a portion of a browser's developer tools Network tab is visible, showing a list of statements and a search bar.



■ Learning Objects, learning unit

-  Wie viel wissen Sie schon?
-  Grundlagen der Ereignisbehandlung und Binding
-  Übung: EventHandler
-  Properties in JavaFX
-  Die Klasse javafx.scene.control.Slider und Maus-Ereignisse

 Übung: Slider

Slider: Aufgabe 1

Im Programm `SliderCircle` positionieren Sie den Schieber links

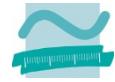
```
root.setLeft(slider);
```

statt unten. Welche Aussage ist korrekt?

Es ist nicht mehr möglich, den Schieber zu schieben.

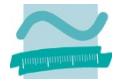


Smart Learning Project



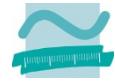
■ Course





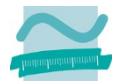
■ xAPI Statements

```
{ "actor": { "mbox_sha1sum": "13648454125cf6ef31a9e632389c9a806316c9ad" }, (1)
"verb": { "id": "http://adlnet.gov/expapi/verbs/answered" }, (2)
"object": { (3)
  "id": "https://vhf143.beuth-hochschule.de/...?itemID=U05LX0ZUU19BRkdfRmV1Y2h0ZXNjaHV0el8wMV9NQw",
  "definition": { "type": "http://adlnet.gov/expapi/activities/question",
    "name": { "de-DE": "Bauphysikalische Grundlagen" } }
},
"result": { (4)
  "score": { "scaled": 0.5, "min": -1, "max": 1 },
  "response": "[\"Die Wasserdampfsättigungsmenge ist die Höchstmenge an Wasserdampf die Luft bei einer bestimmten Temperatur aufnahmen kann.\"]",
  "duration": "PT0H1M11S",
  "extensions": {
    "https://slehwr&46;beuth-hochschule&46;de/xapi/extensions/questionType": "choiceMultiple",
    "https://slehwr&46;beuth-hochschule&46;de/xapi/extensions/correctResponsePattern": [
      "Die Wasserdampfsättigungsmenge ist die Höchstmenge an Wasserdampf die Luft bei einer bestimmten Temperatur aufnahmen kann.",
      "Der Wasserdampfdruck ist abhängig von der relativen Luftfeuchtigkeit und der Lufttemperatur."
    ]
  }
},
```

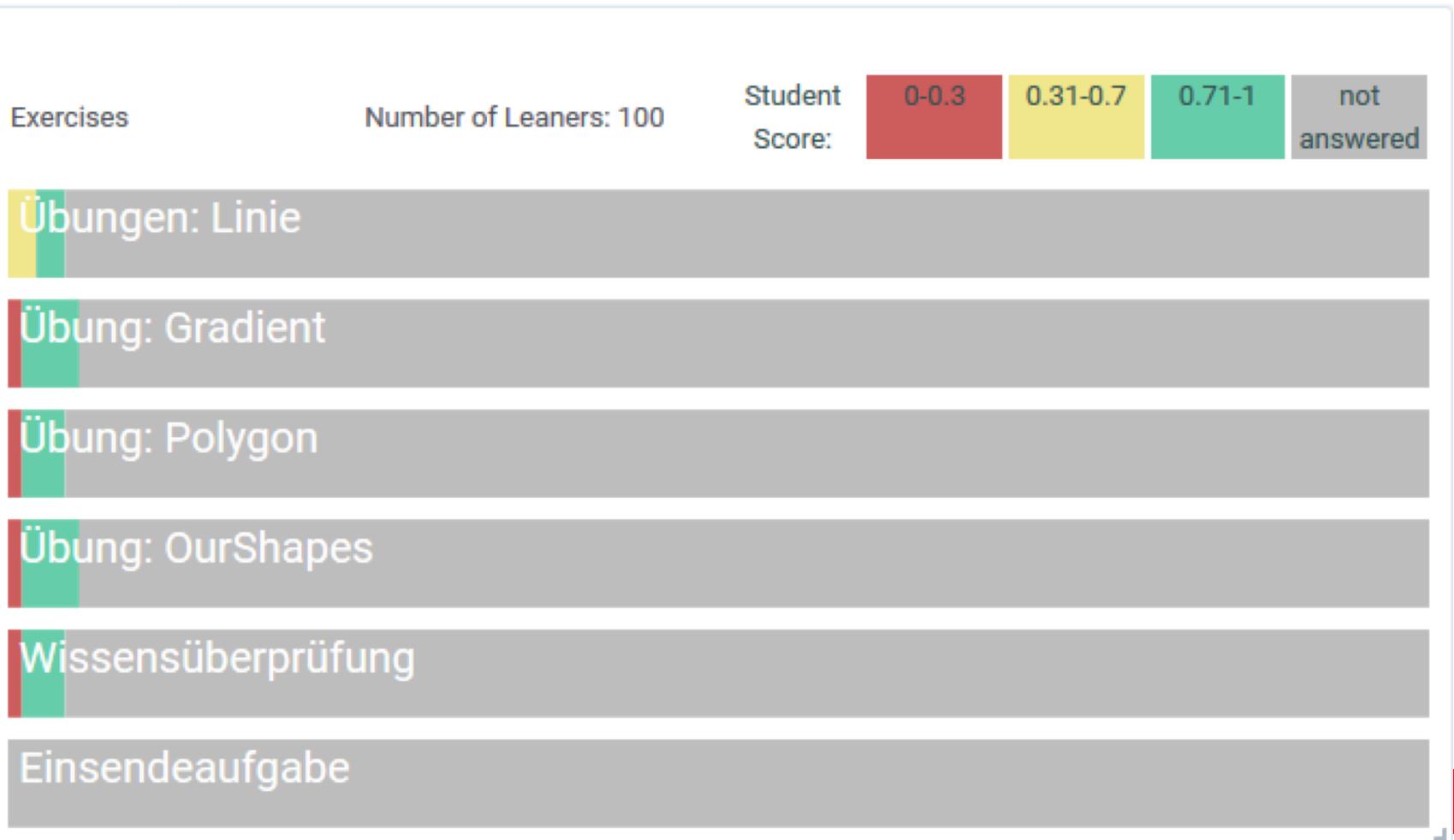


- xAPI Statements stored in Learning Locker
- Imported into elasticsearch
- Visualisation with the Grafana Framework



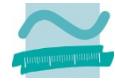


- For teachers: what is the knowledge level of the class? Exercises Level





Traffic-Light Visualisation

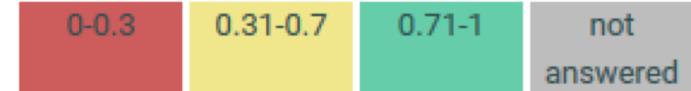


- For teachers: what is the knowledge level of the class? Learning unit level

Exercises

Number of Learners: 100

Student
Score :



Grafische Benutzeroberfläche in JavaFX – Grundlagen

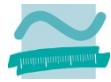
Grafische Benutzeroberfläche in JavaFX – 2D Grafik

Grafische Benutzeroberfläche in JavaFX – Ereignisbehandlung und Binding

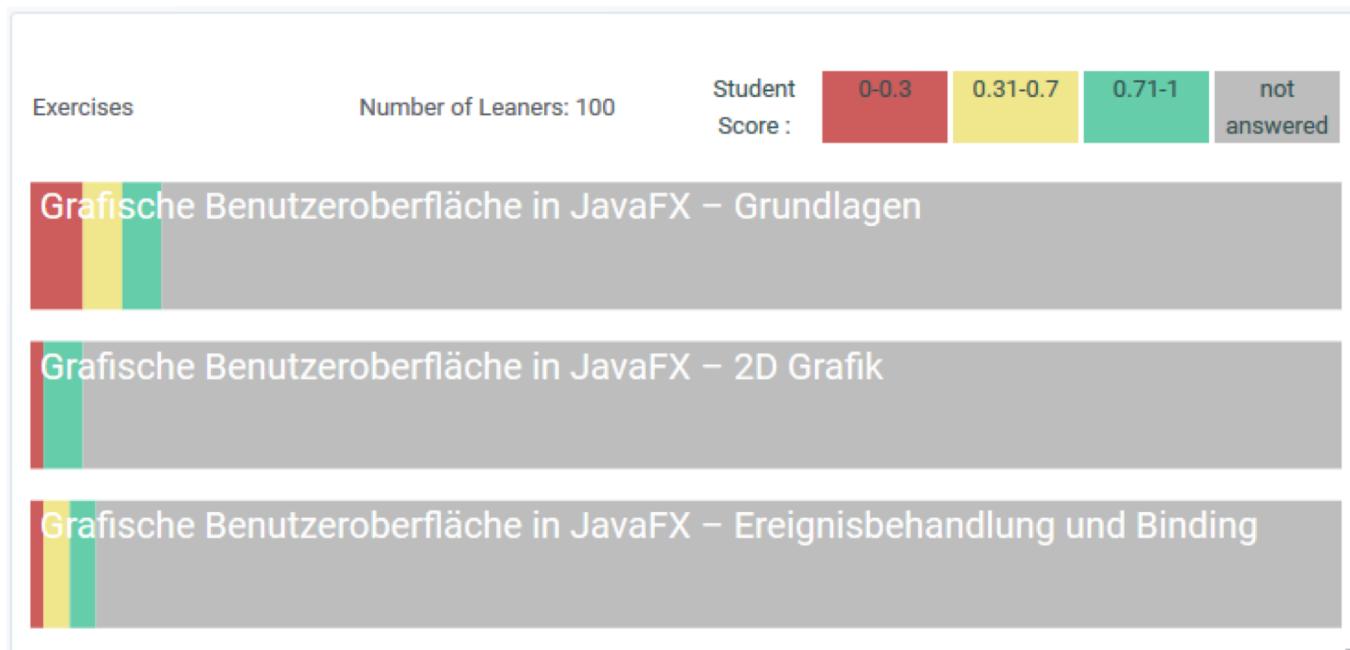


- Learning unit level: calculation
 - Grey → 0
 - Red → 1
 - Yellow → 2
 - Green → 3
- Example: learning with 3 exercises
 - 2 correct, 1 not attempted: $(3+3+0)/3 = 2$
 - 2 correct, 1 wrong: $(3+3+1)/3 = 2.3$
 - 2 correct, 1 partially correct: $(3+3+2)/3 = 2.6$



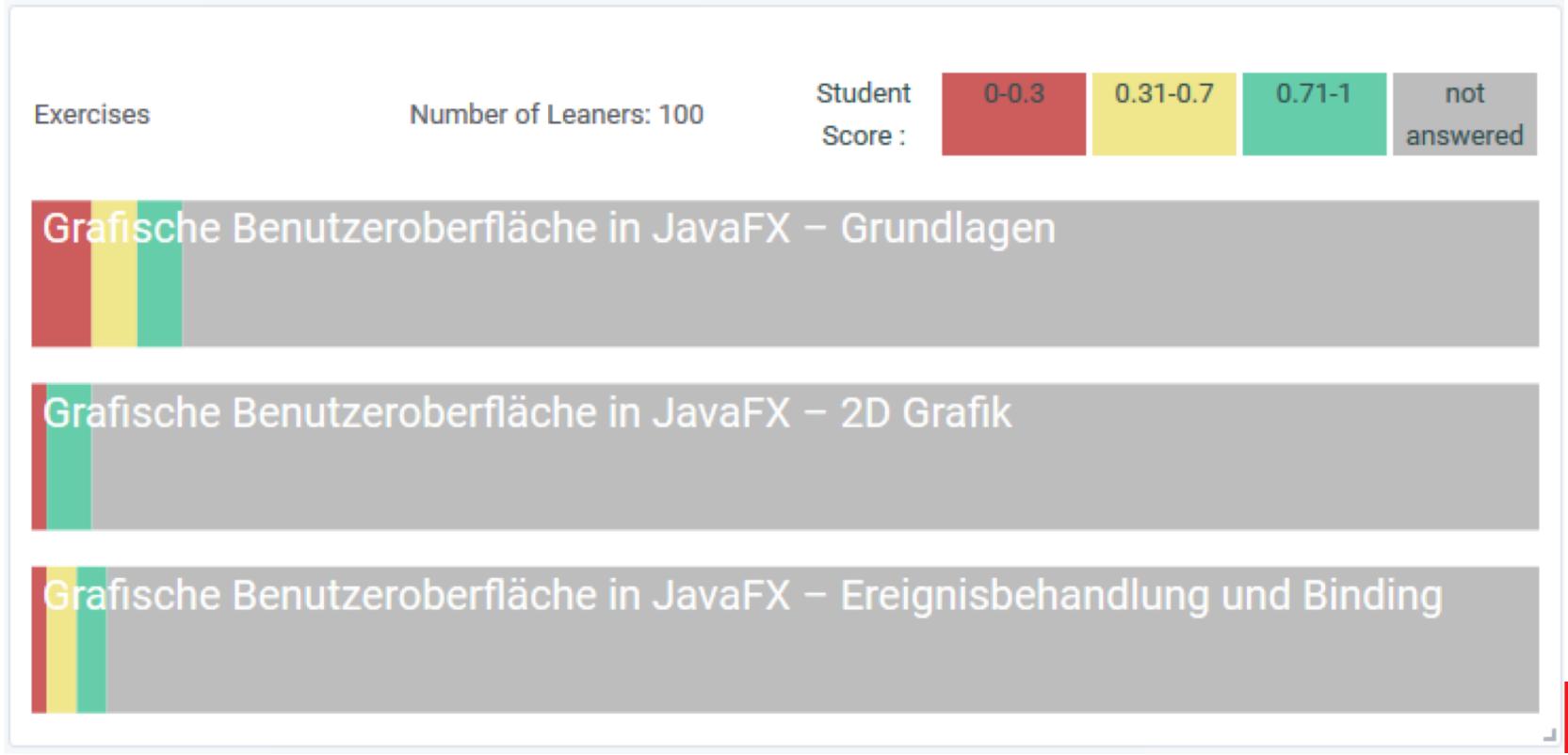


- Next level: same calculation
 - Grey → 0
 - Red → 1
 - Yellow → 2
 - Green → 3





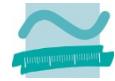
- Why this aggregation? For revisions at the end of a part or of a course.



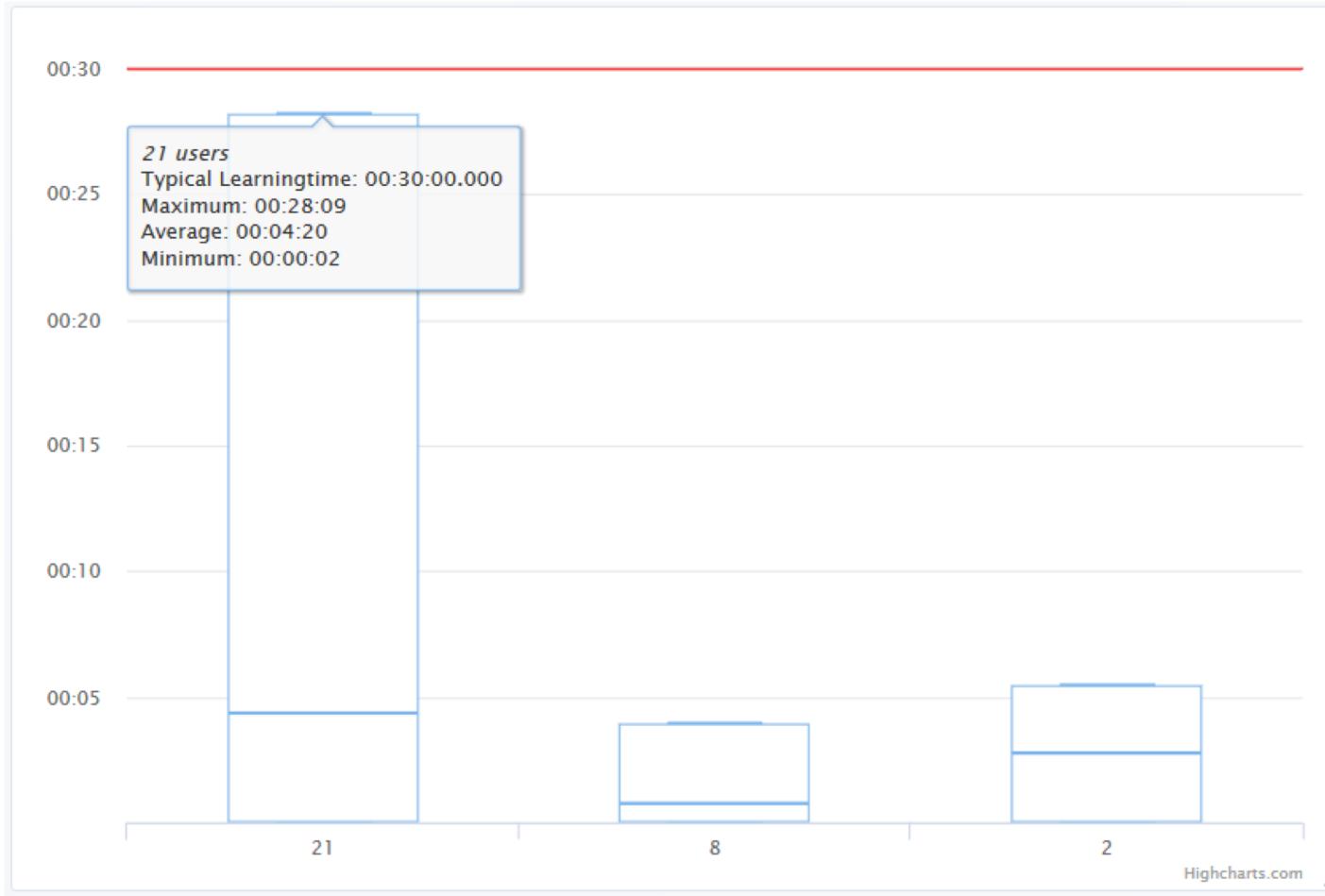


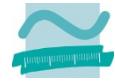
- For instructional designers
 - Score of last attempt (default for teachers)
 - Average score
 - Minimal score
 - Maximal score
 - Total number of attempts



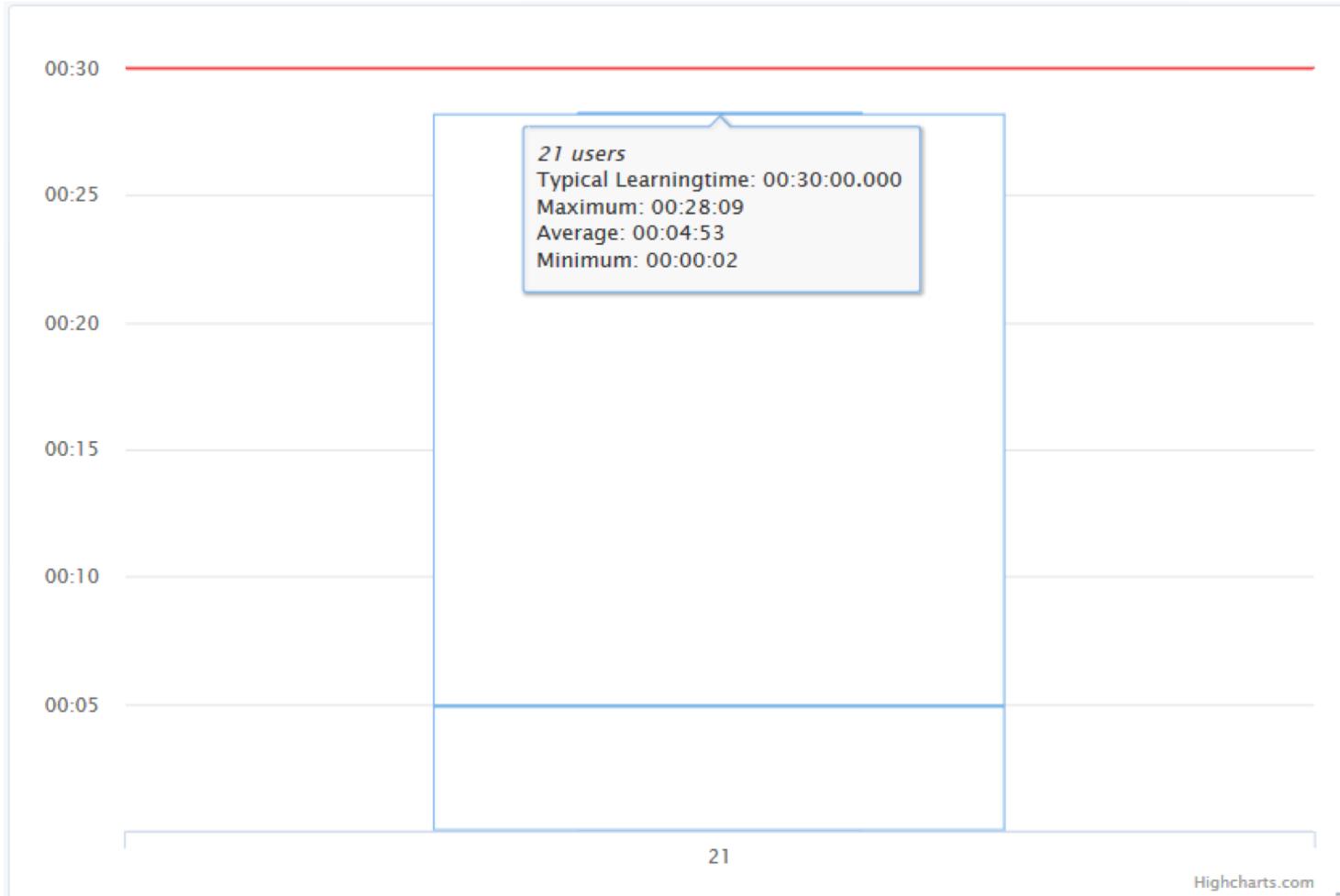


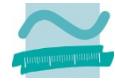
- For instructional designers / teachers: is the typical learning time realistic?



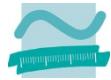


- Is the typical learning time realistic? Total time on an object.



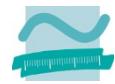


- Involve teachers and instructional designers:
 - $N = 3$ teachers and three meetings
- Change the way of teaching is not easy
- Exercises carefully designed

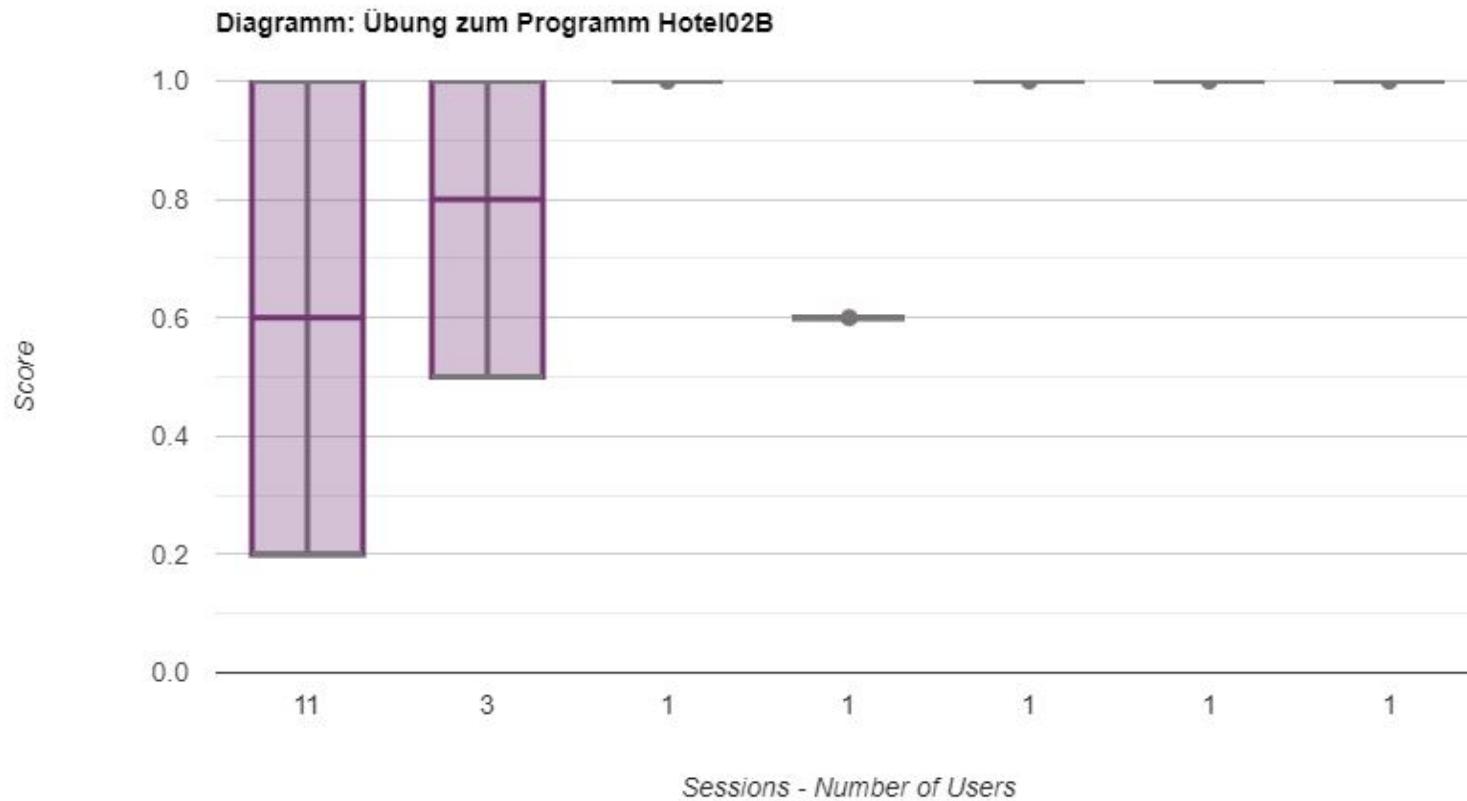


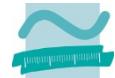
- Traffic-Light visualisation:
 - For teachers
 - For instructional designers
- Learning-Time visualisation
 - For instructional designers in cooperation with teachers



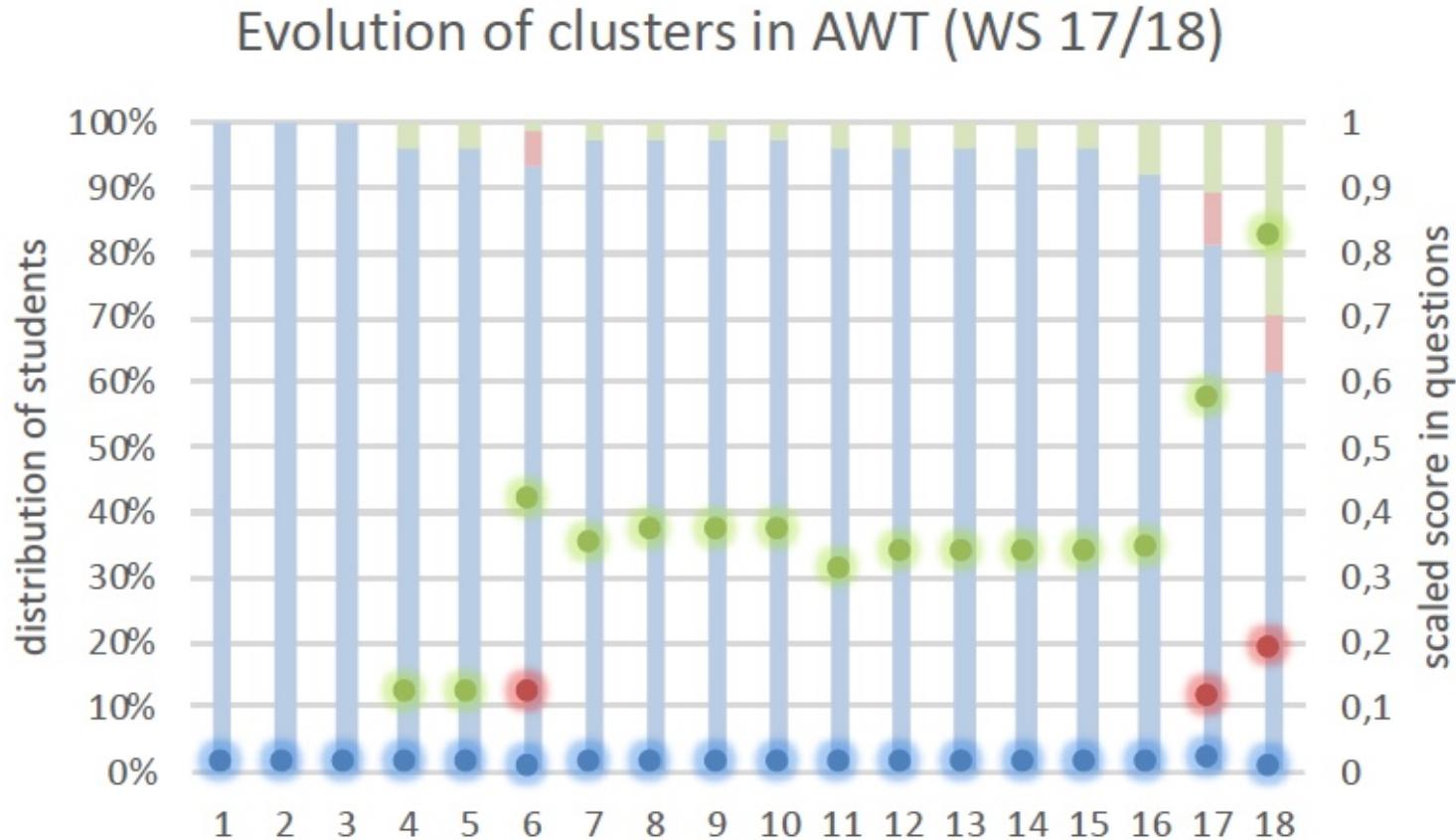


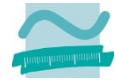
■ Visualizing Attempts





- Solving exercises correctly associated with better performance





- Solving exercises correctly associated with better performance
 - Visualise with badges?

An, T.-S., Krauss, C., Merceron, A. 2017. Can Typical Behaviours Identified in MOOCs be Discovered on other Courses? In Proceedings of the 10th International Conference on Educational Data Mining, EDM'2017, Wuhan, China, June 25-28, p. 220-225. An, T.-S., Krauss, C., Merceron, A. 2018. On the Emergence of Typical Behaviours in LMS. LA-Workshop, DeLF1 2018.



Thank you



- <https://projekt.beuth-hochschule.de/smartlearning/>

