

Thematic article

# A Mobile Suitcase for Informatic Teachers Related to the “Digital” Didactic Goals of the 21<sup>st</sup> Century

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## Abstract

This study deals with the optimal equipment of a mobile suitcase for computer science teachers, which offers the possibility to teach the skills of the curricula from primary to high school of the 21<sup>st</sup> century. First, the Single Board Computers (SBCs) in question are filtered out from previous studies and the accessory parts required are determined through a quantitative market analysis. Then, by combining the results with a qualitative analysis according to Mayring, the degree of curricular coverage of individual accessories is determined and binarized. Afterwards, the optimal equipment of the mobile suitcase is evaluated and established based on the cost overlap by horizontal summation and vertical inclusion of the necessary accessories after recording the prices and the budget. The results were clearly presented in network diagrams and lists. This study thus provides computer science teachers and computer science professors with a budget-dependent basis for making decisions about the contents of a mobile suitcase for computer science lessons or a computer science laboratory for learning the skills of the curricula from primary to high school of the 21<sup>st</sup> century. The study closes with a summary and an outlook.

*Keywords:* 21<sup>st</sup> century skills; STEM didactic; education tools; computer used in education; single board computers

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## Introduction

The teaching of digital content and processes has been included in the curricula of primary to high school in recent years. The implementation of teaching digital content in the subject area of education therefore requires new technical aids and special hardware requirements. To meet these, single-board computers have become more important in the field of education. In the study "Digital didactic objectives of primary, secondary, and higher education curricula in the 21<sup>st</sup> century executable with a single-board computer" by Nothacker & Lavicza, the skills of the 21<sup>st</sup> century in computer science teaching were presented based on the curricula and examined whether they could be realised with a single-board computer (Nothacker et al., 2020: 350). In the subsequent study of 2021 "Low-costs computer learning sets and the relation to the digital didactic goals of the 21<sup>st</sup> century," Nothacker carried out a quantitative market analysis of currently available single-board computers and determined the degree of congruence between the two parameters using a combinatorial approach of properties from the technical documentation of individual products and the digital competences and skills to be taught in the curricula of the primary to high school levels (Nothacker, 2021). Nothacker provides a list of suitable single-board computers that meet the requirements of the curricula and allow a product to be selected according to the available budget. In these studies, however, it was not clarified what a configuration of a learning set for computer science teachers that corresponds to the curricula of the 21<sup>st</sup> century looks like. This is precisely where this study comes in. In this study, the question that will be investigated is, "What must a mobile suitcase for modern computer science teaching contain in order to meet the latest requirements of the curricula as fully as possible?" The budget is limited to \$100 per participant. An internet connection via Wireless Local Area Network (WLAN) is assumed.

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## Research design and Methods

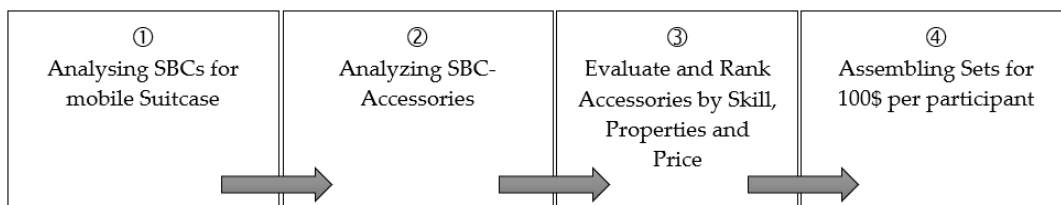
In order to be able to fulfil the objectives of this study, the "Mixed Methods" method according to Creswell is applied (Creswell, 2014: 50).

The MAXQDA2020 Analytics Pro software, in combination with Microsoft Excel, was used to record the hardware and its characteristics, as well as to record the corresponding filters and create the evaluations and graphics.

First, the necessary accessories are filtered out through a quantitative market analysis and then the curricular coverage of individual accessories is determined and binarized with a qualitative analysis according to Mayring (Mayring, 2014: 26). Considering the studies by Nothacker & Lavicza from 2020 and Nothacker 2021, the corresponding SBC model with the associated accessories is determined by combining the summary costs, while considering the budget limit of \$100 per participant. Those combinations that are within the given budget limit are of particular interest in this study.

The study closes with a recommendation for the content of the hardware per mobile suitcase in relation to the content to be taught in the subject area of computer science at different types of schools, with the possibility for justification.

**Figure 1.** Research-Procedure



The author points out that the quantitative survey is a snapshot of the items and prices currently available on the market at the time of the survey. It is possible that at the time of publication of this study, new products will add to the variety of choices. For this reason, the quantitative and qualitative selection criteria were chosen in such a way that new products can easily be included in the evaluation scheme.

## Results

In the following, the examination results are listed according to the flow chart of Figure 1.

### *Analysing SBCs for mobile Suitcase*

The study by Nothacker 2021 shows the recommended single-board computers to be used depending on the budget of the individual institutions. In this study, the selection was made for the SBCs in places 1-4, and thus for the SBCs in the Raspberry Pi family in different versions, so that teachers and learners could concentrate exclusively on the task creation or problem-solving level without having to familiarise themselves with a new platform each time. The models all have a 40-pin GPIO port, which is a prerequisite for connecting various accessories for experimental use. Thus, the models Raspberry Pi Zero W (Raspberry Pi Zero W, 2021), Raspberry Pi 4 (Raspberry Pi 4, 2021) in various configurations (2GB, 4GB and 8GB) as individual models and the Raspberry Pi Compute Module (Compute Module 4, 2021) with the Raspberry Pi Compute Module 4 Development Board (Compute Module 4 IO Board, 2021), as well as the Raspberry Pi 400 as a model with integrated keyboard and 4GB RAM (Raspberry Pi 400, 2021), are used for selection. In addition, the RPI 4 kit (Raspberry Pi 4 Kit, 2021) and RPI 400 kit (Raspberry Pi 400 Kit, 2021) were selected for comparison.

### *Analysing SBC-Accessories*

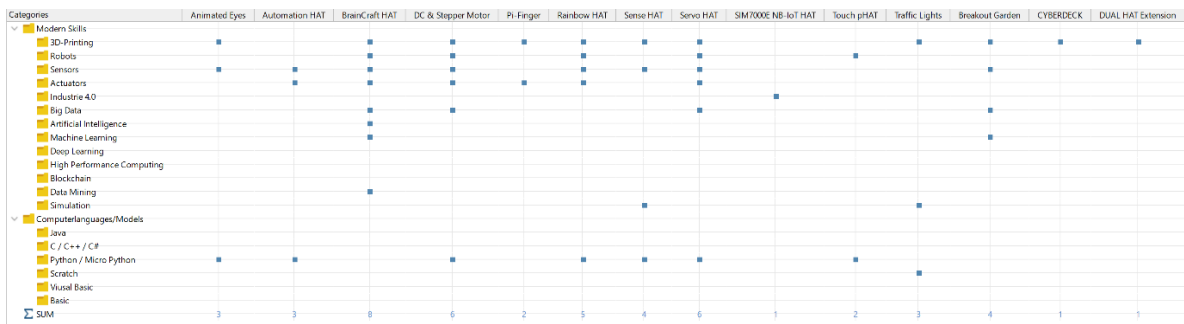
It was decided to use accessories that are complementary to each other and comply with the complete conditions of the curricular specifications. It was also decided that all the interfaces provided by the device should be covered so that the participants could get to know them all. For this purpose, the internet platform "pinout.xyz" was used to find the suitable accessories (Raspberry Pi HATs, 2021), which are known as Hardware Attached on Top (HAT). The result set was restricted according to the \$100 limit. The following HATs "Animated Eyes" (Adafruit Industries, 2021), "Automation HAT" (Automation HAT Mini 2021, 2021), "BrainCraft HAT" (BrainCraft HAT, 2021), "DC & Stepper Motor" (DC et al., 2021), "Pi-Finger" (The Pi Hut,

2021), “Rainbow HAT” (Rainbow HAT , 2021), “Sense HAT” (Raspberry Pi Sense HAT, 2021), “Servo HAT” (Adafruit Industries, 2021), “SIM7000E IoT HAT” (The Pi Hut, 2021) , “Touch pHAT” (Touch pHAT, 2021), “Traffic Lights” (4tronix, 2021), “Breakout Garden” (Breakout Garden for Raspberry Pi, 2021), “CYBERDECK” (Adafruit Industries, 2021), “DUAL HAT Extension” (The Pi Hut, Raspberry Pi 400 Dual HAT, 2021) were identified.

According to Nothacker & Lavicza 2020, this includes that all competences can be covered by a certain hardware constellation. This means that the hardware has certain characteristics and must fulfil certain capabilities. In this study, the skills were limited to the "modern skills," such as 3D-Printing, Robots, Sensors, Actuators, Industry 4.0, Big Data, Artificial Intelligence, Machine Learning, Deep Learning, High Performance Computing, Blockchain, Data Mining and Simulation (Nothacker et al., 2020: 356).

Figure 2 lists all selected HATs. In addition, the programming languages to be used are listed. The Deep Learning, High Performance Computing and Blockchain categories are dependent on a network connection and can be covered accordingly depending on the SBC model used. To determine the coverage with existing properties, the HATs were analysed with the properties given as categories and listed in Figure 3. Accordingly, the Rainbow HAT and the BrainCraft Hat are followed by the Sense HAT and the Automation HAT modules with very diverse possibilities.

**Figure 2.** SBC-Accessories HATs combined with Modern Skills



**Figure 3.** SBC-Accessories Interface analysis



*Evaluate and Rank Accessories by Skill, Properties and Price*

To be able to rank the accessories, they were evaluated according to the fulfilment levels of the skills, existing properties, and the price information at the time of the consultation. In Figure 4, the order for the capabilities and features of the accessories have been sorted in descending order and the price details in ascending order.

**Figure 4.** SOC-Accessories Ranking by Alphabet, Skill, Properties and Price

*SOC-Accessories Ranking*

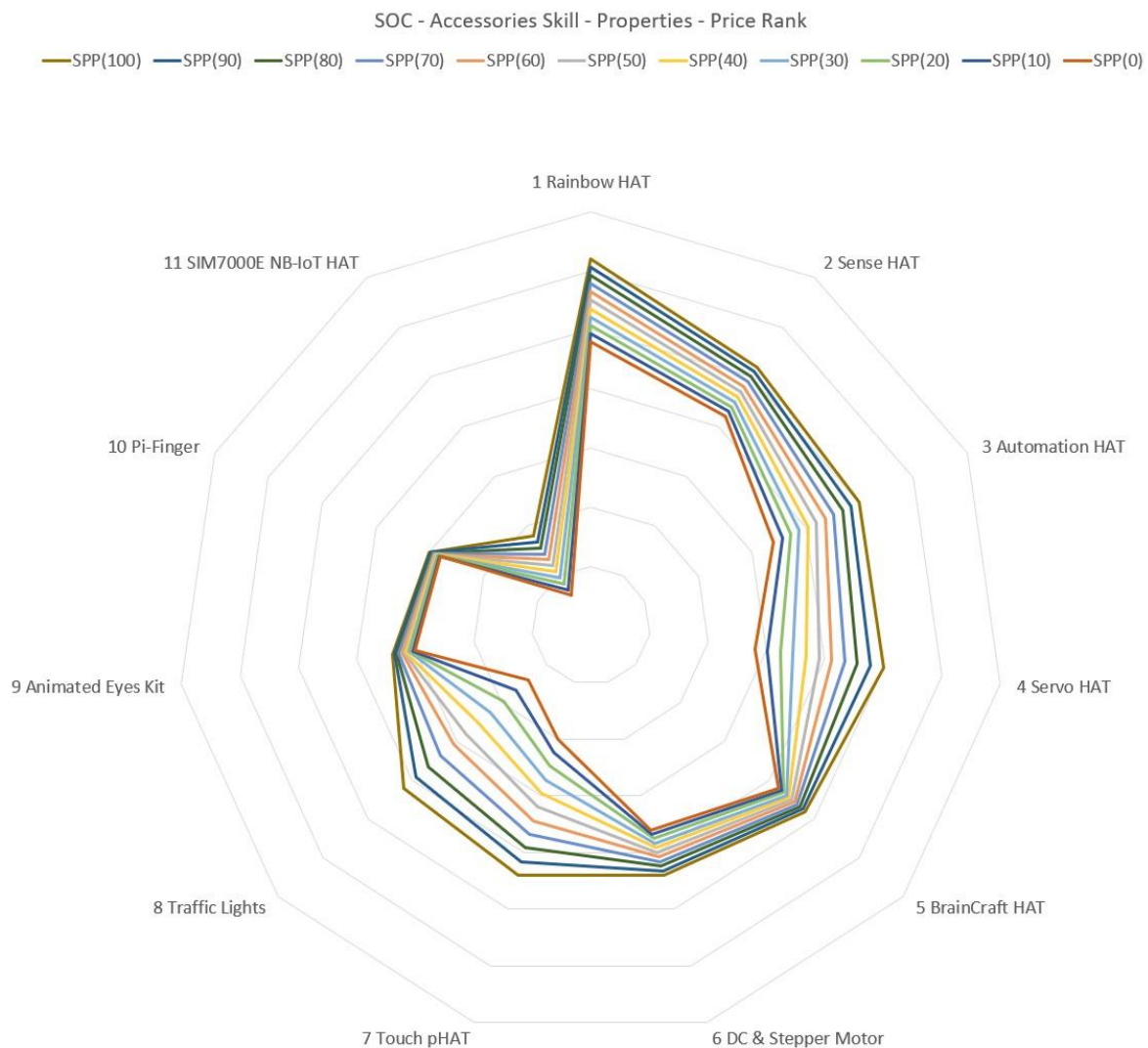
Nr	Sort by Alphabet	Skil (%)	Prop(31)	(%) Price (\$)	Nr	Sort by Skill	Skil (%)	Prop(31)	(%) Price (\$)	Nr	Sort by Prop	Skil (%)	Prop(31)	(%) Price (\$)	Nr	Sort by Price	Skil (%)	Prop(31)	(%) Price (\$)	
1	Animated Eyes Kit	3	21,4	5	16,1	49,95	3	BrainCraft HAT	8	57,1	12	38,7	44,95	3	BrainCraft HAT	8	57,1	12	38,7	44,95
2	Automation HAT	3	21,4	7	22,6	21,95	6	DC & Stepper Motor	6	42,9	4	12,9	38,45	9	Rainbow HAT	5	35,7	12	38,7	29,33
3	BrainCraft HAT	8	57,1	12	38,7	44,95	11	Servo HAT	6	42,9	3	9,7	12,66	10	Sense HAT	4	28,6	9	29,0	36,92
4	Breakout Garden	4	28,6	3	9,7	14,83	9	Rainbow HAT	5	35,7	12	38,7	29,33	2	Automation HAT	3	21,4	7	22,6	21,95
5	CYBERDECK	1	7,1	4	12,9	8,95	4	Breakout Garden	4	28,6	3	9,7	14,83	8	Pi-Finger	2	14,3	6	19,4	60,75
6	DC & Stepper Motor	6	42,9	4	12,9	38,45	10	Sense HAT	4	28,6	9	29,0	36,92	1	Animated Eyes Kit	3	21,4	5	16,1	49,95
7	DUAL HAT Expansion	1	7,1	3	9,7	19,56	1	Animated Eyes Kit	3	21,4	5	16,1	49,95	5	CYBERDECK	1	7,1	4	12,9	8,95
8	Pi-Finger	2	14,3	6	19,4	60,75	2	Automation HAT	3	21,4	7	22,6	21,95	6	DC & Stepper Motor	6	42,9	4	12,9	38,45
9	Rainbow HAT	5	35,7	12	38,7	29,33	14	Traffic Lights	3	21,4	2	6,5	4,14	13	Touch pHAT	2	14,3	4	12,9	9,66
10	Sense HAT	4	28,6	9	29,0	36,92	8	Pi-Finger	2	14,3	6	19,4	60,75	4	Breakout Garden	4	28,6	3	9,7	14,83
11	Servo HAT	6	42,9	3	9,7	12,66	13	Touch pHAT	2	14,3	4	12,9	9,66	7	DUAL HAT Expansion	1	7,1	3	9,7	19,56
12	SIM7000E NB-IoT HAT	1	7,1	3	9,7	33,94	5	CYBERDECK	1	7,1	4	12,9	8,95	11	Servo HAT	6	42,9	3	9,7	12,66
13	Touch pHAT	2	14,3	4	12,9	9,66	7	DUAL HAT Expansion	1	7,1	3	9,7	19,56	12	SIM7000E NB-IoT HAT	1	7,1	3	9,7	33,94
14	Traffic Lights	3	21,4	2	6,5	4,14	12	SIM7000E NB-IoT HAT	1	7,1	3	9,7	33,94	14	Traffic Lights	3	21,4	2	6,5	4,14

To obtain a meaningful graph depending on the budget, the skills, properties, and price values must be added horizontally and ranked vertically under the influence of the price. The result is a ranking of accessories according to their best suitability, under consideration of price. This is shown in tabular form in Figure 5.

**Figure 5.** SOC-Accessories by Skill, Properties, and dynamic Price Ranking SPP(0) - SPP(100).

Nr	Accessories	Skil (%)	Prop(31)	(%) Price (\$)	Skill-Points	Prop-Point	Price-Points	SPP(100)	SPP(90)	SPP(80)	SPP(70)	SPP(60)	SPP(50)	SPP(40)	SPP(30)	SPP(20)	SPP(10)	SPP(0)	
1	Rainbow HAT	5	35,7	12	38,7	29,33	8	10	7	25	24,3	23,6	22,9	22,2	21,5	20,8	20,1	19,4	18,7
2	BrainCraft HAT	8	57,1	12	38,7	44,95	11	10	3	24	23,7	23,4	23,1	22,8	22,5	22,2	21,9	21,6	21,3
3	Sense HAT	4	28,6	9	29,0	36,92	7	9	5	21	20,5	20	19,5	19	18,5	18	17,5	17	16,5
4	Servo HAT	6	42,9	3	9,7	12,66	9	2	9	20	19,1	18,2	17,3	16,4	15,5	14,6	13,7	12,8	11,9
5	Automation HAT	3	21,4	7	22,6	21,95	4	8	8	20	19,2	18,4	17,6	16,8	16	15,2	14,4	13,6	12,8
6	DC & Stepper Motor	6	42,9	4	12,9	38,45	9	4	4	17	16,6	16,2	15,8	15,4	15	14,6	14,2	13,8	13,4
7	Traffic Lights	3	21,4	2	6,5	4,14	4	1	11	16	14,9	13,8	12,7	11,6	10,5	9,4	8,3	7,2	6,1
8	Touch pHAT	2	14,3	4	12,9	9,66	2	4	10	16	15	14	13	12	11	10	9	8	7
9	Animated Eyes Kit	3	21,4	5	16,1	49,95	4	6	2	12	11,8	11,6	11,4	11,2	11	10,8	10,6	10,4	10,2
10	Pi-Finger	2	14,3	6	19,4	60,75	2	7	1	10	9,9	9,8	9,7	9,6	9,5	9,4	9,3	9,2	9,1
11	SIM7000E NB-IoT HAT	1	7,1	3	9,7	33,94	1	2	6	9	8,4	7,8	7,2	6,6	6	5,4	4,8	4,2	3,6
12	Breakout Garden	4	28,6	3	9,7	14,83	3	1	2	6	5,8	5,6	5,4	5,2	5	4,8	4,6	4,4	4,2
13	CYBERDECK	1	7,1	4	12,9	8,95	1	3	1	5	4,9	4,8	4,7	4,6	4,5	4,4	4,3	4,2	4,1
14	DUAL HAT Expansion	1	7,1	3	9,7	19,56	1	1	3	5	4,7	4,4	4,1	3,8	3,5	3,2	2,9	2,6	2,3

Figure 5 shows which HATs are best suited to cover the 21<sup>st</sup> century skills while containing the maximum variety of interfaces, taking price into account as a percentage. According to the budget, the percentage influence of price was included in the analysis from SPP(100) (a higher importance was attributed to a lower price point) to SPP(0) (a lower importance was attributed to a higher price point). In Figure 5, a horizontal separator line was drawn between no. 11 and no. 12, as accessories no. 12, 13 and 14 represent adapters for better local positioning in the form of relocation of the 40-pin port interface or to another plug-in system “Breakout Garden.” For this reason, the accessories with the numbers 12, 13 and 14 were not included in the graphic representation in Figure 6. The accessories are to be considered in addition to the various HATs for better operability, such as accessory no. 14 "DUAL HAT Expansion," which offers the possibility of operating 2 HATs in parallel or plugging an additional display into one of the ports and thus managing without an external screen. Which HAT combinations make sense and are possible within the budget of \$100 per participant will be discussed in section 3.4.

**Figure 6.** SOC-Accessories by Skill, Properties and dynamic Price Ranking SPP(0) – SPP(100).

#### *Assembling Sets for 100\$ per participant*

To filter out the best configuration for a mobile suitcase, the various HATs with the SOC from section 3.1 must be combined with the accessories from section 3.3. To do this, the individual models offered are differentiated once again in the designs and combined with the various HATs, cumulated horizontally, and ranked vertically. The list of results was vertically supplemented by kit offers from the supplier Pimeroni, who offers not only the keyboard, SD card with the NOOBS operating system, power supply unit and housing for the corresponding SOC, but also "The official Raspberry Pi Beginner's Guide" to the SOC in a set. The provider was only selected as an example and serves only as orientation in this study. Individual parts were added horizontally (addons), such as power supply units, SD card with operating system, keyboard, to be able to make a comparison with the kits offered. To operate the "BrainCraft HAT," or to explore the CSI interface, a camera is necessary. Therefore, a day and night vision camera, as well as a touch screen display, were added horizontally to the list. The additional touchscreen display is used to realise autonomous work without other devices, quasi as a monitor replacement. The individual solutions were considered for corresponding numbers of participants with 10, 20 or 30 participants and corresponding budgets of \$1000 - \$3000. It was assumed that the group size per unit consists of at least 2 but no more than 3 persons. The results are presented in tabular form in Figure 7.

Figure 7. Mobile Suitcase Content depending on \$100 Budget per participant

Nr	Accessories	Skill (%)	Prop (%)	Price (\$)	HATs											Adapter			Power			Addons			Budget									
					1	2	3	4	5	6	7	8	9	10	11	Breakout Garden	CYBERDECK	DUAL HAT Expansion	PS RPi 4/400 (5.1V 3A)	PS RPi CM4 (1.2V 3A)	PS RPi Zero (5V 1A)	SO-Cred 35 GB w. NOODBS	Keyboard	HyperPixel 4.0 Touch Disp.	Camera V2.1 (Lx) / Noir (Lx)	Budget 10 Participants 1000\$	Budget 20 Participants 2000\$	Budget 30 Participants 3000\$						
1	RPi CM 2GB 8 GB EMMC Board + Ant + W	23	95.8	33	71.7	86,69	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1219,62	-219,62	1999,02	0,98	2778,42	221,58	
2	RPi CM 2GB 16 GB EMMC Board + Ant + W	23	95,8	33	71,7	92,04	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1246,37	-246,37	2052,52	-52,52	2858,67	141,33	
3	RPi CM 2GB 32 GB EMMC Board + Ant + W	23	95,8	33	71,7	97,39	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1273,12	-273,12	2106,02	-106,02	2938,92	61,08	
4	RPi CM 4GB 8 GB EMMC Board + Ant + W	23	95,8	33	71,7	102,86	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1300,47	-300,47	2160,72	-160,72	3020,97	-20,97	
5	RPi CM 4GB 16 GB EMMC Board + Ant + W	23	95,8	33	71,7	108,21	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1327,22	-327,22	2214,22	-214,22	3101,22	-101,22	
6	RPi CM 4GB 32 GB EMMC Board + Ant + W	23	95,8	33	71,7	114,14	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1356,87	-356,87	2273,52	-273,52	3190,17	-190,17	
7	RPi 4 (2GB)	21	87,5	31	67,4	38,61	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1025,32	-25,32	1615,72	384,28	2206,12	793,88	
8	RPi 4 (4GB)	21	87,5	31	67,4	68,32	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1173,87	-173,87	1912,82	87,18	2651,77	348,23	
9	RPi 4 (8GB)	21	87,5	31	67,4	83,72	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1250,87	-250,87	2066,82	-66,82	2882,77	117,23	
10	RPi 400 4GB WLAN	20	83,3	30	65,2	85,40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1170,22	-170,22	1905,52	94,48	2640,82	359,18	
11	RPi Zero WLAN	20	83,3	27	58,7	13,58	x	x	x	x	-	x	x	x	-	x	x	x	x	x	x	x	x	x	x	x	x	815,09	184,91	1280,34	719,66	1745,59	1254,41	
<b>Pimeroni Kits</b>																																		
12	Pi Zero W Complete Starter Kit					40,87	x	x	x	x	-	x	x	x	-	x	x	x	x	x	x	x	x	x	x	x	x	807,19	192,81	1268,44	731,56	1729,69	1270,31	
13	Raspberry Pi 400 Kit					107,25	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1219,16	-219,16	2012,31	-12,31	2805,46	194,54	
13	RPi 4 2GB Desktop Kit					111,31	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1239,46	-239,46	2052,91	-52,91	2866,36	133,64	
14	RPi 4 4GB Desktop Kit					133,58	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1350,81	-350,81	2275,61	-275,61	3200,41	-200,41	
15	RPi 4 8GB Desktop Kit					155,84	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1462,11	-462,11	2498,21	-498,21	3534,31	-534,31	

*Mobil Suitcase Content*

The list in Figure 7 shows the recommended contents of the mobile suitcase. In order to achieve the maximum equipment with optimal budget utilisation, the Pimeroni kits should be used for the Raspberry Pi Zero (Figure 7, No. 12). This results in the greatest savings potential at around \$240. The number of group participants plays a subordinate role here. Even smaller groups of 10 or more participants with a budget surplus of about \$240 are still justifiable. When choosing the Raspberry Pi Zero (no. 11 or 12), however, you must do without interesting HATs such as the "BrainCraft Hat" and the "Animated Eyes" due to its lower performance. These HATs are also only particularly useful for the topics "Artificial Intelligence" and are therefore only suitable for secondary or high school levels. The "Breakout Garden" adapter has been included as a special expansion option, in which sensors, displays or other actuators can be plugged in via sockets using individual plug-in cards. For the selection of the plug-in cards, the budget for the 5-piece set is about \$192, for the 10-piece set about \$731 and for the 15-piece set over \$1200, which are not dealt with in detail in this study. The prices for the plug-in cards range from \$5.50 (temperature sensor) to \$61.88 (thermal imaging camera) depending on the sensor or actuator.

For Secondary or High School, consider whether existing devices such as screens, tablets, keyboard and mouse or PCs can be used. If at least keyboard and screens are already available, the Raspberry Pi with 4GB main memory (Figure 7, No. 8) with the specified accessories is recommended. Depending on the size of the group, a set of 10 or 15 devices is recommended. In order to be as independent as possible from other equipment and the environment, a mobile suitcase must be able to use the full variety of SOCs and HATs without the presence of other equipment.

For example, the Raspberry Pi 400 (Figure 7, No. 10) can be used to equip a mobile suitcase with 10 units. This can cover group sizes of 2-30 people, with a subgroup size of 2-3 people. If particular emphasis is placed on subgroups of 2, the number of SOCs should be increased to 15.

In the absence of an internet connection, at least one 4G LTE router must be included in the suitcase, which can provide all participants with high-speed internet access.

In the case that there is no power from the socket at the place of use, a power source in the form of a power bank should be included in the purchase planning, such as a power bank with 13000 mAh from "Intenso," which costs about \$25 per device and can supply the devices with power for up to about 15 hours.

The mobile suitcase can be usefully supplemented by one or two "Robot Car(s)" for about \$70 each, which usually contain a distance sensor, a line sensor, RGB LEDs, DC motors and servos as learning objects. The "robot car" can also serve as a success check for the participants after they have successfully learned the individual functions and interfaces and can be combined with other interesting tasks to be able to replicate authentic real-life scenarios, e.g. recognising traffic signs or other objects with the camera or other exciting projects.

## Conclusions and Outlook

This study deals with the optimal equipment of a mobile suitcase for computer science teachers related to the digital didactic goals of the 21<sup>st</sup> century, which offers the possibility to teach the skills of the curricula from primary to high school. In order to be able to make a concrete statement here, the study by Nothacker and Lavicza 2020 was used as a basis for the skills analysis and the study by Nothacker 2021 "Low-cost Single-Board-Computers and Learning-Sets and the Relation to the "Digital" Didactic Goals of the 21<sup>st</sup> Century" with a result list of suitable SBCs as a basis for this study. The SOCs to be used and the corresponding accessories were combined, analysed and listed on the basis of the two studies. Subsequently, under the influence of the budget, which was limited to \$100 per person, the optimal equipment of the mobile case was filtered out on the basis of the cost overrun of the necessary accessories. The result was clearly presented in network graphics and lists. The result of this study thus gives computer science teachers and computer science professors a basis for decision-making about the contents of a mobile suitcase for computer science teaching or a computer science laboratory for learning the skills of the curricula from primary to high school of the 21<sup>st</sup> century. This study can be developed as the basis of a comprehensive teaching concept for the use of a mobile suitcase in connection with learning tasks and assessments. The author recommends developing such a scenario through station learning, where the participants can get to know the individual accessories of the case and their interface types in more depth.

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