Designing a high-efficiency teacher's clothing for highly effective students

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Abstract:

 A lot of recent research is concerned with the fashion and style of uniform clothes used by workers, students, and in the highest technological fields. In different educational levels, there is no many researches on teacher's clothes. The teacher's uniform is one of the centerpieces of the educational process, whereby the attention of all students in the classroom might be affected dramatically. This research was concerned with proposing simple design of shirt with 3 **different colors** for a teacher's clothing (black, blue and white) and 3 colors of board (black, white, green). The color components of the cloths and blackboard and the difference between them were measured. A model was made to measure the extent of cognition, intelligence and observation among children in the middle school age stage. A statistical analysis of the results of the measurement of intelligence and cognition degrees was carried out for the research samples consisting of **15** students- have no medical eye problems (8 of them are boys and 7 of them are girls)- in the first year of middle school. The research concluded that the clothes that have blue colors with simple designs help the students to focus and perceive higher than all the proposed designs.

Introduction

Cotton is the most widely used of the textile fibers because of its intrinsic properties of biodegradability, breathability, hydrophilicity, comfortability and versatility, etc. therefore, it is an excellent substrate for dyeing and printing as well as for imparting high performance with additional functionalities. Typical examples of such functionalities are antimicrobial activity, softness, easy-care, flame retardancy, and water &oil repellency (**Abou Elmaaty et al 2018; El-Nagar et al 2005**).

Gentile and Imberman 2012; studied the use of the uniform in public schools is increasing, but we know little about how it affects students at different educational levels. In an impact study in a large metropolitan school in the southwestern United States, we evaluate how uniforms affect behavior, achievement, and other outcomes. Each school in the district determines adoption independently, saving variation on schools and time. By including student and school effects, we find evidence that uniform adherence improves attendance in secondary classes, while in primary schools generates significant increases in teacher retention.

Fashion styling and design aesthetics are very important even in spacesuit. The elements of the arts are very important portions of human life, aerospace technology and development (**Chang 2021, Howell 2020, Coldewey 2020, Richardson 2018, Siceloff 2017**).

Claxton and Kent 2020, studied how the design can be successfully managed in the fashion retail industry to support the circular economy. They defined environmentally sustainable fashion product design through the lens of to sustainable design strategies and integrate them into working pract ices to achieve organizational objectives. Development of sustainable fashion design practice by providing a critical review of the organization of sustainable fashion design also considered.

Katry H and Ismael 2021. They studied the effect of coverage factor and the type of fabrics (woven and knitted) on the comfort properties and waterproof and pore size properties. The Results of air permeability (breathability) showed that the textile structure has a great impact on the breathability property of both woven and knitted fabrics, as the higher the density of the threads at a certain limit in the warp and weft directions in woven fabrics and the number of rows and columns in knitted fabrics, the air permeability and breathability decreased. The results also indicated that the higher the coverage coefficient, the lower the porosity, and consequently the higher the particulate filtration efficiency and thus the increase in the protection coefficient. The results also indicated that knitted fabrics are better than woven fabrics when used to make cloth masks.

The surface of the board should not be shiny so that the light reflections that affect the student's vision of what the teacher writes on the board are reduced. Yellow chalk is usually used with green boards so that the contrast between the color of the board and the color of the chalk is reduced, and the sharpness of the eye is not affected in moving between them. Therefore, we find that the green color in the blackboard is much better than the black color.

The color of the blackboard began to change from black to green in the sixties, as black was the old common color of the blackboard in different schools, and according to the Reader's Digest website, an English study proved that the green

color is better than black for the blackboard. This article showed that the reason was that the board was coated with green enamel instead of a black backing. The study indicated that the ceramic enamel material is less expensive and brittle than black boards, and that the green color is more tolerant of writing with chalk, and it is also easier to clean than black boards, and it does not leave white spots from chalk traces, and it is also lighter in weight. That's why the green board has become a major part of most classrooms to this day. Moreover yellow chalk is usually used with green boards due to reduce the contrast between the color of the blackboard and the color of the chalk, it will not be affected the eyes of the students when shifting eyesight between them **(Laliberte 2019)**.

Setchell 2012 discussed in his book issues with color description and communication. Color ordering systems, named color systems, color naming, and automated color scaling, including lighting and display conditions, and luminance problem are then described **(Loe 2017; Lindemann-Matthies et al 2021)**. Digital imaging systems and their need for color management have been described. This is followed by a discussion on color constancy, scaling, and color difference, with explanations for calculating color coordinates, and the derivation of the CIE Standard Observer that provides more detail on these topics. A short discussion section on future directions is completed, and sources of useful information are listed.

There are many environmental factors in the classroom that strongly influence the behavior and interaction of students during the educational process. The researcher used virtual reality (VR) technology to examine whether the complexity of the classroom affects how likely teachers are to notice disturbances and how they react after observation. The study showed that the characteristics of the classroom environment can affect teachers' observation of disturbances and their reactions to them **(Huang et al 2021)**.

Veszeli and Shepher 2019 studied the effect of color and size of colored overlay on the reading capabilities and they found the used color overlay reduced the reading time more than the size of the reading aid.

Experimental work
Fabric Used
Weaving structures of the tested plain (1/1) cotton weaved fabric structure of weight $(125\pm0.5)g/m^2$, 44 warp x 35 weft yarns.
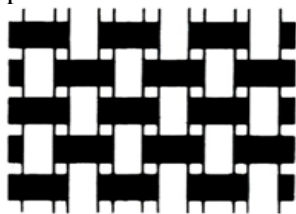

| Figure (1) Plain 1/1 weaving structure | Sample Code: | 5 | 1 | 8 |

Shirt design
It was designed in line with the basic requirements of the lecturer/teacher, which reflects the personality that the students are attracted to without compromising the student's focus and not to distract their thinking and maintaining the appearance that gives the impression of prestige and attraction to the teacher's appearance. three colors of the same shirt design (White, black and blue)
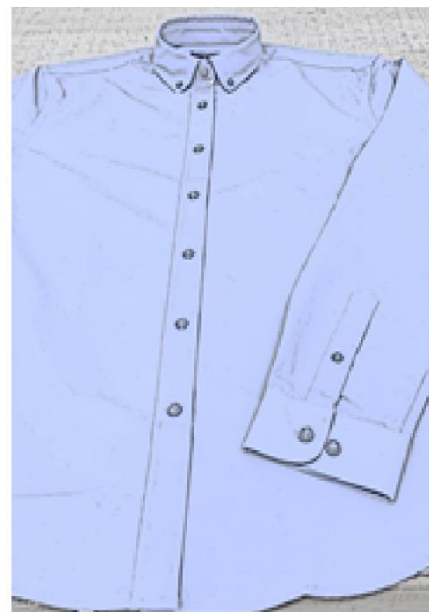

Figure (2)

Color discrimination test

The ability to distinguish between colors was measured for each of the 15 students (8 males and 7 females) and in a classroom, by placing a board with the six test forms (flashes) in the middle of the board next to the clothes in its three colors (brown, navy and white), taking into account that the harm is Artificial daylight bulb so as not to affect the color discrimination test.

Reading skills test

The reading ability of each of the 15 students (8

Number of Pages   :1 page
Number of words   :36 word
Number of characters   :158 character
Number lines   :4 lines

boys and 7 girls) was tested individually. The reading speed and number of mistakes in reading were measured for each student. This is done by placing a picture in the center of the board with writing in font 40 – Simplified Arabic - with a distance of 1.5 between the lines. The picture contained 4 lines of Arabic writing of total 36 words. Arabic text was taken from Farouk Juwaida's poetry (the Egyptian first preparatory curriculum).

و بين الضلوع وفوق الجبين   حملناك يا مصر بين الحنايا

و إن طال فينا زمان الحنين   عشقتناك صدرا رعانا بدفء

ضياء يشع على العالمين   سيبقى شبابك رغم الليالي

غدا سوف يأتي بما تحلمين..   فهيا اخلعي عنك ثوب الهموم

Color Testing

The CIE-Lab. values of the color changes were measured using double beam spectrophotometer. The colors are given in (CIE) Lab coordinates,(L):brightness(100=white,0=black),(a): red-green coordinate (positive sign=red, negative sign= green),and (b): yellow-blue coordinate (positive sign=yellow, negative sign=blue). All measurements were measured in comparison with the standard white tile that has traceability to SI measurement system. The used spectrophotometer was calibrated for photometric and wavelength scales (Nour et al 2010, El-Nagar et al

2012, Elnagar et al 2013))

Statistical Analysis

The results in the prepared color discrimination test (Ishihara test) were statistically analyzed after expressed as Likert Scale Interval with the three points i.e., correct (3), Do not know (2) and Wrong (1) for each gender and colors variation between the teacher cloth and the board (Norman 2010). The reading skills were averaged and standard deviation and variance coefficient of all 15 students sample were calculated.

Results and Discussions

Table (2) color of the shirts under study

Code	L	A (red-green)	B (yellow-blue)	h	s	L	color
w5	0.119	0.835	-2.271	240	100	1	Black
w1	3.015	6.957	-21.161	228	100	8	Blue
w8	86.340	0.012	-0.009	0	0	240	White

Table (3) color of the teaching class board

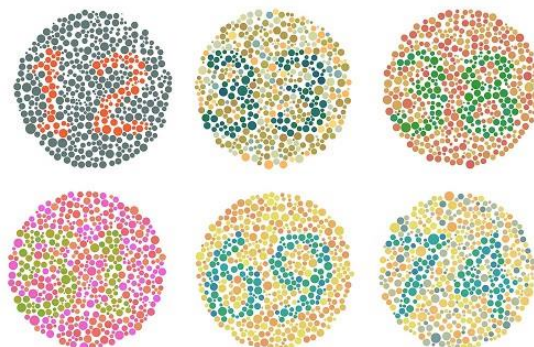| Code	L	A (red-green)	b (yellow-blue)
Board 1	11	-1.814	5.425
Board 2	44	-42.317	31.019
Board 3	90	-2.174	1.572

Figure (2) Ichihara color blindness Correct reading consequently; 12, 33,38 (first raw) 51,69,74 (second raw)
(https://www.colorlitelens.com/ishihara-test, Sept 2021)

Figure 2 shows Ichihara color blindness test. This test involves placing the students in front of a blackboard with either (white, black or green color), of a uniform color in the form of dots, and containing a set of numbers written in the manner of colored dots, provided that the student reads the numbers and their colors. If the student gets the correct answer, it means that he does distinguish between colors on the blackboard, but if he fails to see the same numbers, it means that he is color blind and cannot see exactly what on the blackboard. In the case of the student seeing colors close to brown, this means that he suffers from color blindness towards red and green, while in the case of failure to distinguish between yellow and blue colors, the patient has a defect in the optic nerve **(https://www.colorlitelens.com/ishihara-test, Sept 2021)**
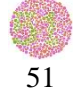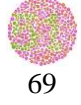
Table (2) Mutual variation of teacher shirt and board colors.

Board / Teacher shirt	Black	Green	White
Black	Table 3	Table 6	Table 9
Blue	Table 4	Table 7	Table 10
White	Table 5	Table 8	Table 11

The data included in tables 3 reveal that, by studying the effect of the color of the teacher's **black** shirt and the **black**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 66.7%, while the different colors (12, 33, 38, 74) students' ability reaches 100%.
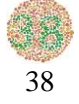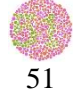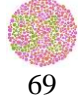
Table (3) the effect of the color of the teacher's **black** uniform and the **black**board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	15.0	15.0	10.0	10.0	14.0
Correct%		93.3	100.0	100.0	66.7	66.7	93.3
NA		0.0	0.0	0.0	3.0	1.0	0.0
NA%		0.0	0.0	0.0	20.0	6.7	0.0
Wrong		1.0	0.0	0.0	2.0	4.0	1.0
Wrong%		6.7	0.0	0.0	13.3	26.7	6.7
Average		3.0	3.0	3.0	2.6	2.5	2.9
Standard Deviation		0.0	0.0	0.0	0.8	0.9	0.5
CV%		0.0	0.0	0.0	30.7	34.6	18.0

The data included in tables 4 reveal that, by studying the effect of the color of the teacher's **blue** shirt and the **black**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 60 and 80%, while the different colors (33, 38, 74) students' ability reaches 100%.

Table (4) the effect of the color of the teacher's **Blue** shirt and the **black**board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	15.0	15.0	9.0	12.0	15.0
Correct%		93.3	100.0	100.0	60.0	80.0	100.0
NA		0.0	0.0	0.0	1.0	1.0	0.0
NA%		0.0	0.0	0.0	6.7	6.7	0.0
Wrong		1.0	0.0	0.0	5.0	2.0	0.0
Wrong%		6.7	0.0	0.0	33.3	13.3	0.0

Average	2.9	3.0	3.0	2.3	2.7	3.0
Standard Deviation	0.5	0.0	0.0	1.0	0.7	0.0
CV%	18.0	0.0	0.0	42.4	27.1	0.0

The data included in tables 5 reveal that, by studying the effect of the color of the teacher's **white** shirt and the **black**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 60 and 80%, while the different colors (33, 38, 74) students' ability reaches 100%.

Table (5) the effect of the color of the teacher's **white** uniform and the **black**board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	15.0	15.0	11.0	8.0	15.0
Correct%		93.3	100.0	100.0	73.3	53.3	100.0
NA		0.0	0.0	0.0	1.0	2.0	0.0
NA%		0.0	0.0	0.0	6.7	13.3	0.0
Wrong		1.0	0.0	0.0	3.0	5.0	0.0
Wrong%		6.7	0.0	0.0	20.0	33.3	0.0
Average		2.9	3.0	3.0	2.5	2.2	3.0
Standard Deviation		0.5	0.0	0.0	0.8	0.9	0.0
CV%		18.0	0.0	0.0	32.9	42.8	0.0

The data included in tables 6 reveal that, by studying the effect of the color of the teacher's **black** shirt and the **green-**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 73.3 and 80%, while the different colors (38, 74) students' ability reaches 100%. (Colors 12& 33) reached to 93.3%.

Table (6) the effect of the color of the teacher's **Black** uniform and the **green** board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	14.0	15.0	11.0	12.0	15.0
Correct%		93.3	93.3	100.0	73.3	80.0	100.0
NA		0.0	0.0	0.0	0.0	0.0	0.0
NA%		0.0	0.0	0.0	0.0	0.0	0.0
Wrong		1.0	1.0	0.0	4.0	3.0	0.0
Wrong%		6.7	6.7	0.0	26.7	20.0	0.0
Average		2.9	2.9	3.0	2.5	2.6	3.0
Standard Deviation		0.5	0.5	0.0	0.9	0.8	0.0
CV%		18.0	18.0	0.0	37.1	31.8	0.0

The data included in tables 7 reveal that, by studying the effect of the color of the teacher's **blue** shirt and the **green-**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 73.3, while the different colors (38, 74) students' ability reaches 100%. (Colors 12& 33) reached to 93.3% and 86%.

Table (7) the effect of the color of the teacher's **Blue** uniform and the **green** board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	13.0	15.0	11.0	11.0	15.0
Correct%		93.3	86.7	100.0	73.3	73.3	100.0

NA	0.0	0.0	0.0	0.0	0.0	0.0
NA%	0.0	0.0	0.0	0.0	0.0	0.0
Wrong	1.0	2.0	0.0	4.0	4.0	0.0
Wrong%	6.7	13.3	0.0	26.7	26.7	0.0
Average	2.9	2.7	3.0	2.5	2.5	3.0
Standard Deviation	0.5	0.7	0.0	0.9	0.9	0.0
CV%	18.0	25.7	0.0	37.1	37.1	0.0

The data included in tables 8 reveal that, by studying the effect of the color of the teacher's **white** shirt and the **green-**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 73.3 and 86.7%, while the different colors (33, 38, 74) students' ability reaches 100%. (Colors 12) reached to 93.3%.

Table (8) the effect of the color of the teacher's **white** uniform and the **green** board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	15.0	15.0	11.0	13.0	15.0
Correct%		93.3	100.0	100.0	73.3	86.7	100.0
NA		0.0	0.0	0.0	1.0	2.0	0.0
NA%		0.0	0.0	0.0	6.7	13.3	0.0
Wrong		1.0	0.0	0.0	3.0	0.0	0.0
Wrong%		6.7	0.0	0.0	20.0	0.0	0.0
Average		2.9	3.0	3.0	2.5	2.9	3.0
Standard Deviation		0.5	0.0	0.0	0.8	0.4	0.0
CV%		18.0	0.0	0.0	32.9	12.3	0.0

The data included in tables 9 reveal that, by studying the effect of the color of the teacher's **black** shirt and the **white-**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 66.7 and 86.7% respectively, while the different colors (33, 38, 74) students' ability reaches 100%. (Colors 12) reached to 93.3%.

Table (9) the effect of the color of the teacher's **black** uniform and the **white** board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	15.0	15.0	10.0	12.0	15.0
Correct%		93.3	100.0	100.0	66.7	80.0	100.0
NA		0.0	0.0	0.0	1.0	1.0	0.0
NA%		0.0	0.0	0.0	6.7	6.7	0.0
Wrong		1.0	0.0	0.0	4.0	2.0	0.0
Wrong%		6.7	0.0	0.0	26.7	13.3	0.0
Average		2.9	3.0	3.0	2.4	2.7	3.0
Standard Deviation		0.5	0.0	0.0	0.9	0.7	0.0
CV%		18.0	0.0	0.0	37.9	27.1	0.0

The data included in tables 10 reveal that, by studying the effect of the color of the teacher's **blue** shirt and the **white-**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 66.7 and 86.7% respectively, while the different colors (33, 38, 74) students' ability reaches 100%. (Colors 12) reached to 93.3%.

Table (10) the effect of the color of the teacher's **blue** uniform and the **white** board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	15.0	15.0	12.0	12.0	15.0
Correct%		93.3	100.0	100.0	80.0	80.0	100.0
NA		0.0	0.0	0.0	2.0	0.0	0.0
NA%		0.0	0.0	0.0	13.3	0.0	0.0
Wrong		1.0	0.0	0.0	1.0	3.0	0.0
Wrong%		6.7	0.0	0.0	6.7	20.0	0.0
Average		2.9	3.0	3.0	2.7	2.6	3.0
Standard Deviation		0.5	0.0	0.0	0.6	0.8	0.0
CV%		18.0	0.0	0.0	21.7	31.8	0.0

The data included in tables 11 reveal that, by studying the effect of the color of the teacher's **white** shirt and the **white-**board on color discrimination of the 15 students. It shows out that the students' ability to distinguish close colors (numbers 51 and 69) is 66.7 and 86.7% respectively, while the different colors (38, 74) students' ability reaches 100%. (Color 12) reached to 93.3%, (color 33) reached to 80.0%.

Table (11) the effect of the color of the teacher's **white** uniform and the **white** board on color discrimination

Gender	Student No.	Ishihara color blindness test					
		12	33	38	51	69	74
Correct		14.0	12.0	15.0	9.0	11.0	15.0
Correct%		93.3	80.0	100.0	60.0	73.3	100.0
NA		0.0	0.0	0.0	4.0	0.0	0.0
NA%		0.0	0.0	0.0	26.7	0.0	0.0
Wrong		1.0	3.0	0.0	2.0	4.0	0.0
Wrong%		6.7	20.0	0.0	13.3	26.7	0.0
Average		2.9	2.6	3.0	2.5	2.5	3.0
Standard Deviation		0.5	0.8	0.0	0.7	0.9	0.0
CV%		18.0	31.8	0.0	30.1	37.1	0.0

Data in Table study the Effect of mutual interaction between the teacher's shirt and blackboard colors and the fastest reading with the lowest number of mistakes were indicated that the blue shirt of the teacher has the best performance in comparisons with the other mutual colors between the shirts and boards.

Table (12) Effect of mutual interaction between the teacher's shirt and blackboard colors

Shirt Color	Black						Blue						White					
Board Color	Black		Green		White		Black		Green		White		Black		Green		White	
	t(s)	NM	t(s)	NM	t(s)	NM	t(s)	NM	t(s)	NM	t(s)	NM	t(s)	NM	t(s)	NM	t(s)	NM
Average	21.99	0.87	21.44	1.07	21.32	0.67	21.12	0.47	21.04	0.67	21.22	0.53	21.92	0.60	22.07	0.60	22.66	0.60
Stand.Dev	1.16	0.92	1.16	0.96	1.00	0.90	1.12	0.64	1.12	0.90	1.00	0.74	1.03	0.83	1.03	0.83	1.36	0.83
CV %	0.05	1.06	0.05	0.90	0.05	1.35	0.05	1.37	0.05	1.35	0.05	1.39	0.05	1.38	0.05	1.38	0.06	1.38

T(s) Time of reading 36 words; NM number of mistakes.

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