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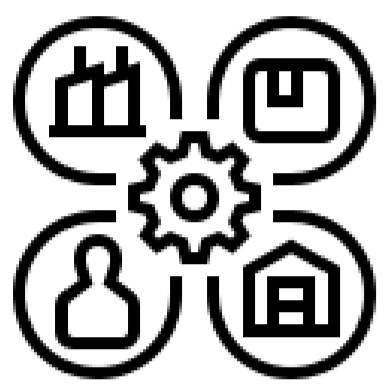
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USING VIRTUAL REALITY TO ASSESS COMMUNICATIONAL SKILLS DURING A COLLABORATIVE TASK WITH TIME PRESSURE

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1 INTRODUCTION

Communication is an essential non-technical skill for any professional interaction [1].



Proven link between non-technical skills and accidents in high-risk jobs [2].

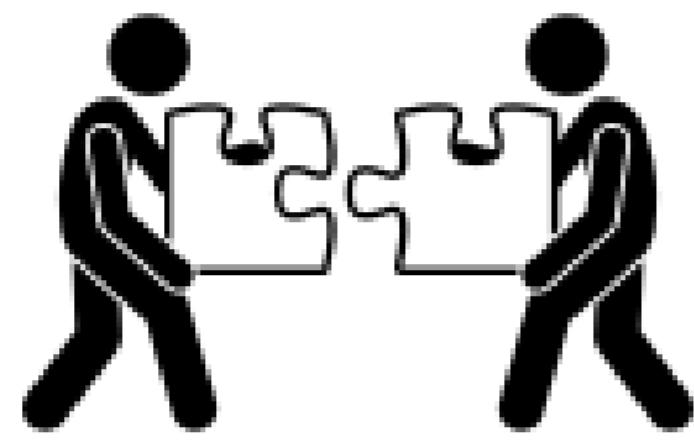
Virtual reality will be used as a means to assess communication skills in an unusual and challenging situation.



2 METHOD

THE VR SIMULATION : THE TASK

- A collective task resolution in a sub-marine environment.
- The team have to collaborate and communicate to succeed.



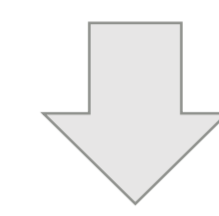
Task Objective

Assemble various pieces to produce a final item

- Comply with a set of rules
- Manage stress caused by various disruptive and stressful elements
- Deal with Time pressure

PARTICIPANTS

23 participants $\mu_{age}=22.5$ years; $\sigma_{age}=.97$ years
 5th-year students from the same engineering school
 Participants randomly divided into 4 groups



Quantitative and qualitative data collected through simulation
 Per group and per participant

Intra-group + inter-group comparison

3 RESULTS

3.a QUANTITATIVE DATA



Performance indicators

- Time taken for the whole mission
- Number of errors
- Time taken for each subtask
- Number of errors per subtask

3.b QUALITATIVE DATA



- Number of participants interventions
- Number of commanders interventions
- Type of Verbal actions produced
 - Commander Vs operators
 - Piece 1 Vs piece 2 Vs 3, etc.
 - Group performance level

First subtask
 $\mu t = 07'48$
 μ erreurs = 9

Evolution of performance indicators

Last subtask
 $\mu t = 00'50$
 μ erreurs = 0

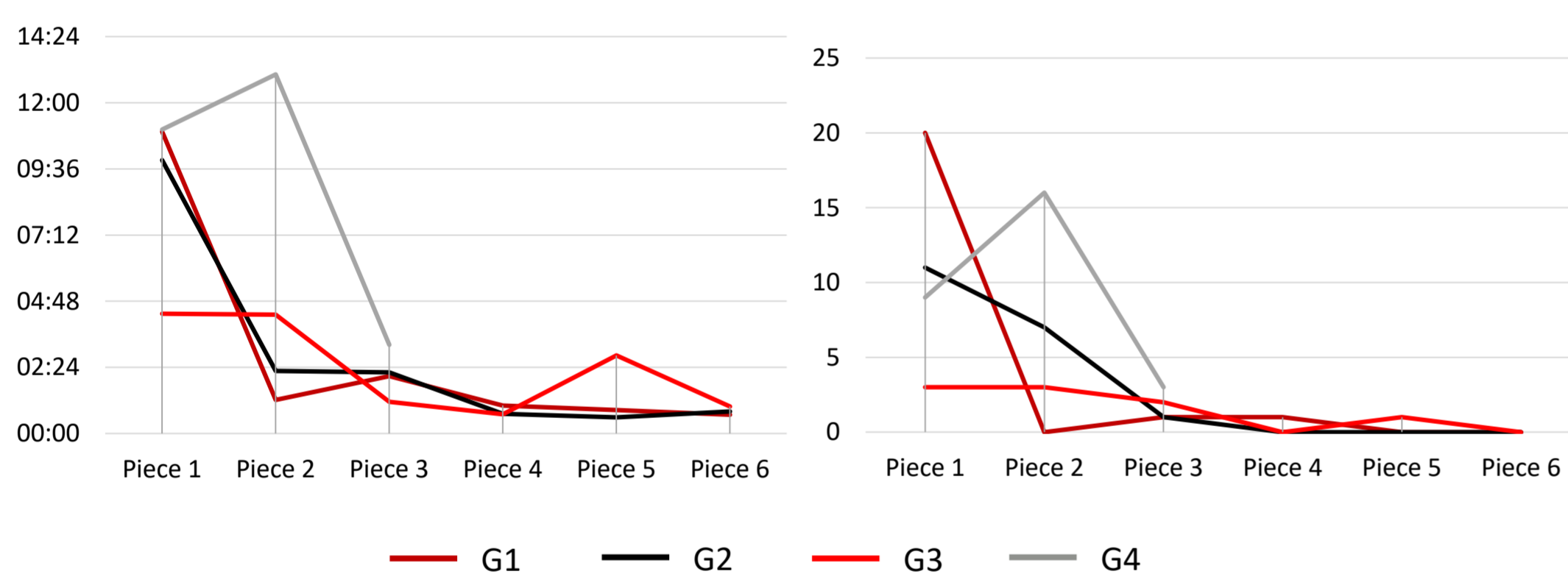


Figure1. time taken and errors number per piece and per group

Natural language

Unstructured, negotiated meaning, interpretation, universal, complex, lengthy

Evolution of used language

Operative language

Structured, concise, restricted lexicon, monosomic, task-specific



Overall, the number of interventions as the task progresses.

For G4, the least efficient, the number of interventions between the first and second part.

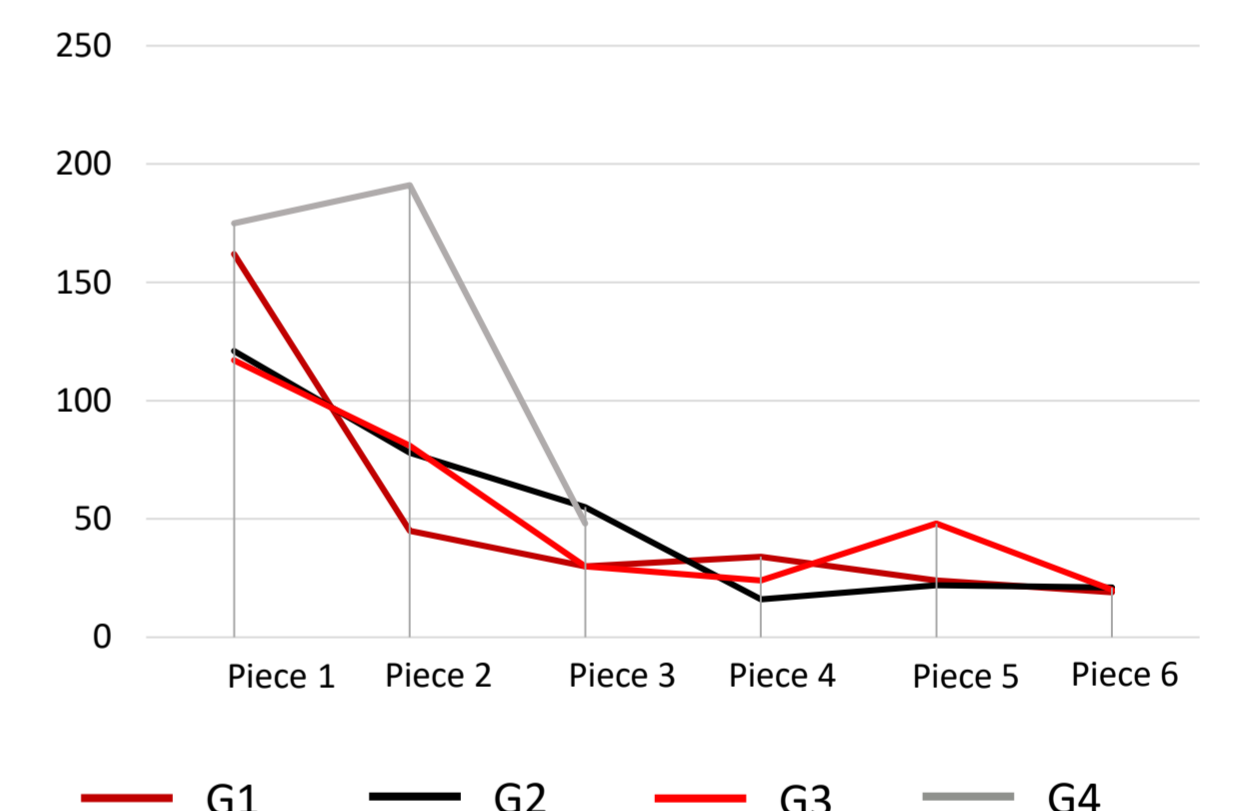


Figure2. Number of verbal interventions per group and per piece

Three types of group stand out

- G1 and G2 : performances between piece 1 and piece 2, and after piece 3.
- G3 performance is with no significant variation in the production of the 6 pieces.
- G4 whose performance fluctuates unexpectedly

Performance indicators at two levels:

- Time /errors
- Task progress level

G3 > G2 > G1 > G4

Low perf.

- Increase in lengthy interventions.
- Lack of involvement.
- Humor during the task execution.
- Help is less given when asked.
- Same questions asked several times.

High perf.

- A progressive decrease in the number of verbal interventions.
- Humor occur at the end.
- Increased demands on the commander.
- More regular situation updates.

4 CONCLUSION & PERSPECTIVES

⇒ New immersive technologies, such as VR, can contribute to the study of nontechnical skills, particularly communication.

What's new?

Non-domain-specific immersive environment

X

Assessing communicational skills

- For professionals : continuing education and occupational risk reduction purposes.
- For researchers : studying various interaction situations.

What's next?

- Future research : different demographic = targeting professionals already employed in various industries.
- Compare the communication skills of future professionals Vs professionals already employed.
- The Debriefing process after simulation ⇒ engage in a process of reflexivity.
- Use the VR simulation as a method for establishing an appropriate environment conducive to smart education [3].
- Measure the long-term effects of VR training on communication skills.

[1] Flin R, O'connor P, Crichton M. Safety at the Sharp End: A Guide to Non-technical Skills. CRC Press; 2017.

[2] Miskovic D, Hull L, Moorthy K, et al. Self vs expert assessment of technical and non-technical skills in high fidelity simulation. Am J Surg. 2011;202(4):500-506.

[3] N. Ye, Dmitrenko, O. V. Voloshyna, S. S. Kizim, K. V. Mnyshenko, and S. V. Nahorniak, "Smart education in the prospective teachers' training," CTE Workshop Proc., vol. 10, pp. 414-429, Mar. 2023, doi: 10.55056/cte.568.