Using analogies to increase the comprehension of AV medium for instructions in mountaineering for the indigenous people of the Northern Himalaya

Author: Hassan Kumar Gundu[1] Supervisor: Prof. Mandar Rane[2]

[1]Student of Communication Design, IDC School of Design, IIT Bombay, Powai, Mumbai, Maharashtra 400076, India (* for correspondence: 176450014@iitb.ac.in, ghk.gxd@gmail.com)

[2]Associate Professor, Communication Design, IDC School of Design, IIT Bombay, Powai, Mumbai, Maharashtra 400076,

Abstract

The northern himalayan belt is a hub for adventure activities such as trekking and mountaineering in the country. This enables the indigenous people residing in these areas to pursue a career as a guide in these activities. But are often restricted because of their limited knowledge involving technicalities of these sport even though they have acquired a certification in the same from one of the mountaineering institutes in the country. A similar experience was encountered when the author was pursuing a course in mountaineering from one the institutes where it was observed that these indigenous locals are unable to grasp certain concepts of mountaineering mainly due to their low proficiency in english and flawed educational background. This acted as a hurdle in their learning during the course. Which if left unaddressed can lead to accidents causing injuries and even loss of life in the future when these people take on the responsibility as guides themselves. In an effort to tackle the same, in this paper we talk about our efforts to explain one such concept of friction involved in making of a clove hitch (a type of knot) in mountaineering using an instructional video created by us. Further we discuss about the issues encountered during the same and how we dealt with it by using analogies derived from the everyday context of these indigenous people.

Keywords: instructional videos, comprehension, mountaineering, analogies, indigenous people

I. Introduction

Dissemination of current instructions

The mountaineering institutes in india receive candidates from all over the country for their mountaineering courses[1]. The instructions delivered during the same are in Hinglish[2]. A language that is a mixture of Hindi and English which is said to have started when english and hindi started occupying the same geographic space [3]. The dominant of the two being Hindi as it is single most spoken language in the country[4]. But even then a lot of terminology involved in the instructions is borrowed directly from english[5]. As these terms are are essential for the understanding the technicalities and concepts involved in learning mountaineering.

Problems for the indigenous people

This is where the indigenous people who enrol into this course struggle. As they have a limited proficiency when it comes to english[6], they face hurdles in learning during the course which are often left unaddressed even after it's successful completion. From the author's own experience during the course[7] it was observed that these people often don't approach the instructors or their coursemates to clear their doubts relating to the underlying concepts during the instructions mainly because of the *power distance* that exists between them. Also on the other hand the instructors possess a *'soft-corner'* for these indigenous people as they are physically superior in comparison to their counterparts and aware of the hardships

these people have to go through living in these regions[8]. This gives them a leeway to graduate from the course with incomplete knowledge. All these things adds up to gaps in their learning.

These gaps in the future can possesses a threat to the safety of the trekkers and mountaineers who will be guided by these people once they graduate from the course. As they can lead to accidents involving serious injuries and even loss of life down the line.

An example of this, would be failing to understand the *concept of friction* which is present when tying a special type of knot known as a *clove hitch*. It allows a climber to safely tie himself to an anchor such as a rock or a tree. This prevents himself from falling to the ground[9].

The Solution

To tackle this issue, using the Audio Video medium (AV medium) we created a set of instructional videos which takes into consideration the above said problems. These instructional videos were part of the author's academic project titled *'Training and teaching aids in mountaineering: Instructional videos on ropework'*[10].

In this paper, we take into account one such video which instructs on *how to make a clove hitch and the concept of friction* involved in it. The focus group under consideration are the indigenous people of the northern himalayan region. Here it was observed that the viewers were able to understand the existence of something called as 'friction'(section IV.) in the hitch from the video but failed to understand the concept of friction involved. So to address the same the author comes up with suitable analogies on spot from their *everyday life to explain friction* and later validates the same (section VI.).

Thus, the paper here talks about our contribution towards increasing the comprehension of delivered instructions via carefully constructed analogies(section V.).

II. The Audio -Video as a medium of instruction

The AV medium was used was create instructional videos for these indigenous people. As it can present information in an attractive and consistent manner[11]. Further, based on constructivism which argues that activities in which learners play active roles can engage and motivate learning more effectively than activities where the learners are passive resulted in follow- along videos where the viewer can follow the instructions on screen to accomplish the task [12]. Upon that we took into account the extensive research available to us which showed that students benefit from video supported e-learning [13]. Some of the benefits of this format are:

- It provides time and location flexibility;
- Fosters self-directed and self- paced learning
- The user can go back and forth in the video to view it as many times it as desirable
- Results in cost and time savings for Educational Institutions and the candidates as well
- Engages multiple senses to enhance learning

These considerations resulted in a total of 4 videos on knots *(one of them being a 'clove hitch' which is a subcategory of friction hitch)* taking into consideration the time that was made available academically to accomplish this project. The salient features of these video were[14]:

- The videos use the local language of hindi
- Emphasizes on the underlying concepts involved in making of knots
- Builds mnemonics to establish memory cues for quick recall for the viewers while tying the knots
- Makes use of slow pace of teaching to cater to people with slow learning capabilities
- Creates a proper structure for

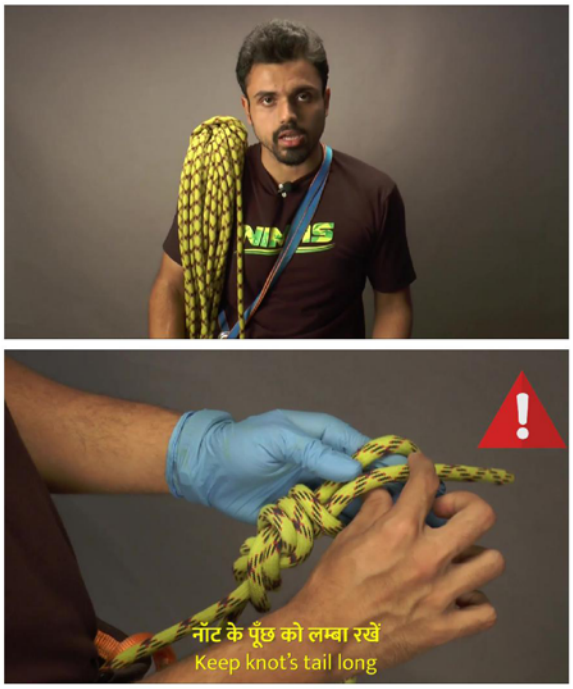

Image: Screenshots from the videos

disseminating the instructions

- Minimises the assumptions involved when it comes to the education background of the viewers

III. Testing the videos with the indigenous people

Next, a decision was made to test these videos to understand the comprehension of them by the indigenous people to develop research insights as part of M.Des course of Design Research seminar for students of Communication Design here at IDC School of Design, IIT Bombay[15].

Research Methodology adopted

A qualitative research methodology was adopted for gathering insights. Since we were dealing with the comprehension of videos by the people, we went with the assumption that this methodology would allow us to gain an understanding of people's views and perceptions of the instructions[16]. The mode of gathering data included creation of detailed notes based on observations, ethnographic research and in-depth interviews with the participants.

Choice of location

The village of lohajung in the Garhwal province of Uttarakhand was chosen for the study. The place acts as a gateway for the treks of Brahmatal, Ali Bugyal and the most renowned Roopkund trek[17]. This results in high inflow of trekkers round the year which creates ample opportunities for the localites to earn a living by working as trek guides, cooks, running trek equipment rentals and small scale shops.

Participants

A total of five participants took part in the study between the age of 21-32. All of them belonged to the Chamoli district of Uttarakhand from the villages of Lohajung, Mundoli, Kanol and Kuling[18]. Two of them had never studied past class X and had no prior experience in mountaineering and the other three had studied till graduation and went through a mountaineering course in the last year and were graded 'A'. They worked as local trekking guides and cooks for the trekking groups in the area. The motivation of the participants to be a part of this experiment and learn about knots comes from the fact *they want to improve their technical expertise and make the treks safer in the region* which is currently dominated by trekking agencies from the outside who pose a serious threat to the areas ecology[19].

Image: The author (to the bottom right of the frame) interviewing the participants in the local NGO office at lohajung

Assumptions for the research

- The participants possess a working knowledge of Hindi
- They have low proficiency when it comes to english language
- They have flaws in their educational background
- They have a motivation to learn mountaineering
- They have access to technological devices such as smartphones with data connectivity
- The participants possess minimum or no knowledge when it comes to knots in mountaineering
- The participants will be able to follow along the instructions on screen to accomplish the task of tying the knot
- The participants will be able to identify and comprehend the underlying concepts involved in tying of the knots such as friction in a clove hitch

Initial procedures

Initially, the participants were interviewed one on one in a local NGO office so as to create a safe and trusted environment for the things to follow. The participants were asked about their [1] background (age, family, education, financial conditions, occupation) [2] previous experiences in mountaineering (courses taken, sources of information) [3] areas of knowledge (terrain, weather and equipment) [4] previous experiences of learning from video [5] making of a clove hitch [6] concept of friction (understanding of what is it, it's the result and application in a clove hitch).

Quick notes were made on the spot which were converted to details after the completion of the experiment. In these interviews with the candidates, it was made clear to us that (1) they had little to no understanding of English (2) they had a knowledge of the equipment involved in trekking as they were used frequently (3) they didn't understand the word 'friction' or 'grashan /takraav' in Hindi or the concept of friction and how it works. (4) the experienced candidates forgot or don't know how to make a clove hitch or what it is.

The video chosen for the paper

The 4 videos which were tested included an introduction to knots, safety knot, bowline knot and clove hitch *[see. Assets, Instructional Videos used for testing]*. For this paper, we focus on the video of the clove hitch *[see Assets, Instructional Videos used for testing, Video3_Basic Clove Hitch]*.

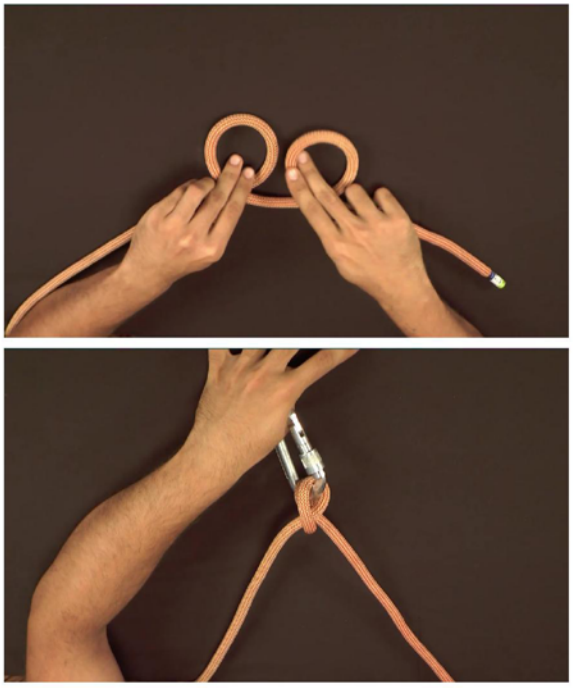

Image: Screens from the video3_Basic Clove Hitch

A clove hitch is used by a climber to tie him /herself to a strong anchor such as a tree, rock etc.

Image: A climber ties herself to an anchor

It is a special kind of knot which cannot exist on its own as it needs to be tied around another object which in our case is a carabiner otherwise it will come undone[20]. **Here the friction between the surfaces of the ropes which is held closer together by the carabiner is the one which actually holds the hitch in its place.** So it is essential for one to understand the concept of friction.

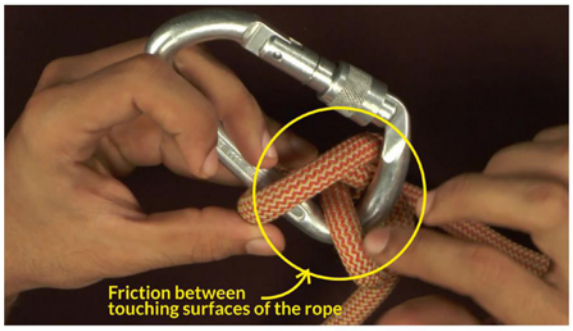

Image: Part of the video explaining the friction between the touching surfaces of the rope

Because, if the friction between the surfaces increases, it produces heat which in turn can lead to the damaging of the surfaces of the object along with that of the rope and can break the hitch leading fall of a climber and in the worst case scenario loss of life. Also at the same time, all the other hitches in mountaineering such as munter hitch, klemheist hitch, prusik hitch all work on the concept of friction[21].

Research questions

1. Are the viewers able to follow the instructions on screen to tie the clove hitch?
2. Were the users able to understand the concept of friction in the hitch?
3. Are they able to tell what makes the hitch a special kind of knot?
4. Are they able to name the equipment involved in the video?

Setup for the study

The videos were shown to the participants over a laptop in the same NGO office where they were interviewed. They were given all the necessary pieces of equipment required to learn the hitch from the video. It included (1) Ropes (2) Carabiners -screw type, snap type (3) figure of 8 descender (4) seat harness

Image: A participant demonstrating the one handed clove hitch using the equipment provided

IV. Comprehension of the viewers

Initial observations

It was observed that all of the participants were able to successfully make the clove hitch using the equipment provided following the instructions on screen. In the interviews post the viewing, it was revealed to us that they were able to understand what makes the clove hitch a special kind of knot as it gets undone when not tied around an object.

Next, they were able to name the equipment as well which were in English. Similarly, they were able to spell the word *'friction'* as well. They did understand that something called as 'friction' existed between the surfaces of the rope. But still, they **didn't identify friction as the underlying reason** which holds the hitch in its place as they didn't understand it.

Literal translation of friction in hindi

After the interview in an attempt to explain friction, a literal translation of it in hindi was used which is 'grashan' or 'takraav'[22]. One of the participants claimed to have heard the term but couldn't explain it. He heard about this term back in his school days. Based on this we came to an understanding that literal translation of scientific terms may not necessarily enhance its comprehension. We can also assume that people may come across results of scientific phenomena in their everyday life but never really question the underlying cause of it.

V. Improvising via analogies to communicate the concept

Establishment of common ground for communication

The use of narratives (stories) or analogies is one means of organizing knowledge in the minds of students[23]. So, as the participants failed to understand the concept of friction between the surfaces of the rope, a decision was made on spot by the author to establish a common ground for communicating the concept using analogies. Extensive research was done to understand the context of these locals during the design of these videos such as their day to day activities[24].

Concept busters as a type of analogy

One way of teaching through analogy is via Concept busters. In this situation, a teacher may find an analogue to explain a difficult concept. For example, when teaching the topic of electricity, the analogy of a river flowing down a hill can be used to explain circuits. *A concept buster can be viewed as a simple comparison between a target (topical idea) and an analogue (what the students already know)* [25].

This enabled us to come up with scenarios using **instances from their everyday life** which could explain the concept of friction.

Here the topic we are trying to *teach* is that of *friction* and the *analogue* are the *instances from their everyday life*. This resulted in the following exchange:

Scenario 1 for Analogy

Interviewer: When it's cold outside why do we rub our hands and what causes the heat which is produced in between our hands?

Participant: We rub the hands because we want to *produce heat* in our bodies and the heat is produced because our hands have a *coarse* feel to it

Interviewer: Yes, this rubbing of surfaces between the hands is what friction is. It's movement of one surface over another('ragadna' in hindi). So, because you are creating friction between the surfaces which coarse heat is produced.

Scenario 2 for Analogy

Interviewer: Why do you develop blisters while trekking for prolonged hours like in this picture?

Image: This is a photograph of the author's feet during the mountaineering course. This image was used as it is extremely graphic to maximize the communication

Participant: Because you are walking for *too long* which makes your feet rub against the sole continuously which starts *wearing* your feet out.

Interviewer: See! so when there's a continuous *rubbing* of surfaces it eventually *wears out as heat is produced just like skin in our feet.*

Scenario 3 for Analogy

Interviewer: Why are you unable to lift a glass of water inside a stainless steel glass with oily hands after having oily food such as puri or paratha?

Participant: Our hands become *smooth* and *loose the coarse feel* to it hence the glass slips out of our hand.

Interviewer: Here the friction between the surfaces again becomes less hence the glass slips out of the hand.

At the end of these three scenarios we **summarized** the takeaways with the participants from each of them which are as follows:

Scenario 1: Friction is a rub between the surfaces and produces heat when two surfaces which are coarse rubs one over the other.

Scenario 2: Continuous friction between surfaces can wear them down and render useless.

Scenario 3: Loss of friction between the surfaces will result in one surface slipping over another.

VI. Validating the understanding of concept

Creating instances of their own

In the interviews post the scenarios, all the participants claimed that they were now able to *understand the concept of friction*. But to validate their claim that we asked them to come up with instances of friction from their surroundings. A few instances given by the participants are as follows:

Instance 1

"We wear microspikes during trekking on snow and ice so that we don't slip because there won't be any friction between the shoe sole and the ice or snow"

Instance 2

"We tie chains to the tyres of our vehicles to prevent them from slipping while driving them on icy roads because there will be no friction present between the tyre and the surface of the road because of ice"

Instance 3

"While climbing on a rock during our BMC course we would rub chalk on our palms to get a good grip on the rock. Otherwise, our palms would slip off the rock because of sweat as sweat reduces the coarseness of our palms which would reduce the friction"

By these instances, it became **evident to us** that the participants were now able to understand the concept of friction and that the analogies used earlier were good enough to establish a common ground for communication between the two parties.

Applying the newly gained knowledge

In order to test the newly gained knowledge another video was shown to these participants. The video was that of a clove hitch which is made using only one hand. This time the participants were able to establish how the friction was functioning in between the smooth surface of the metallic carabiner and coarse surface of the rope as they were able to adjust the length of their rope because of the less friction between these two. At the same time why the hitch won't slip when loaded with a weight of a climber as the friction increased between the rope. *[see Assets, Instructional Videos used for testing, Video4_One handed clove hitch]*

Image: The participants demonstrating the one handed clove hitch

VII. Findings from working of the analogies

Based on the evidence we can draw the conclusion that the reason why these analogies worked is because of the fact that they were extracted from their everyday life. Also, we made the observation that even though people may not understand the underlying phenomena of their certain day to day activities they can still accomplish the desired task.

Next, the analogies involved didn't require any pre requisites in terms of formal education which actually made them independent to be used in the context of these indegeneous people and yeild result.

Suggestions

Based on this study we suggest that the instructional videos can have a dedicated section at the beginning which will first establishes the various english terminologies and scientific concepts along with their meanings so that they can be later recalled in the video. This can ensure that there are no communication gap between the instructions and their comprehension. Also, the analogies given should be such that they should be able to create their own in the future when they try to pass on the instructions further to someone else.

Closing comments

Towards the end, the effectiveness of an analogy would totally depend on its creator. Even though analogies can facilitate communication they can also generate multiple misconceptions as it is a representation of the fact but not the actual fact itself. So precautions should be taken while constructing the analogies especially for the low literates. This can be made sure by developing a strong set of connection between the topical idea and the analog [26].

References

CLICK HERE FOR ASSETS FOLDER: (includes photographs, instructional videos, Project Report)

[1] Students Database HMI Darjeeling: https://hmidarjeeling.com/database-of-hmi-students/
Students Database JIM, Pahalgam:
http://www.jawaharinstitutepahalgam.com/downloads/trainee2018.pdf
http://www.jawaharinstitutepahalgam.com/downloads/trainee2017.pdf

[2] Class on Knots at ABVIMAS Manali: https://www.youtube.com/watch?v=kS9c1Ks-kqI
https://www.youtube.com
watch?v=GWAXff4KzrY&t=886s

[3] Chutnefying English: The Phenomenon of Hinglish edited by Rita Kothari, Rupert Snell
https://books.google.co.in/

[4] Language variations, attitudes and rivalry: The spread of Hindi in India, SN Sridhar, State University of New York at Stony Brook
https://repository.library.georgetown.edu/bitstream/handle/10822/555480/GURT_1987.pdf?sequence=1#page=318

[5] Mountaineering terms: http://nimasdirang.com/Home/Glossary
http://www.jawaharinstitutepahalgam.com/mtn%20terminology.php

[6] 5.5.2 Use of Weak forms, Basic Technical Communication: For Uttarakhand Technical University https://books.google.co.in/books?hl=en&lr=&id=14A6eFLwTv0C&oi=fnd&pg=PP12&dq=spoken+English+uttarakhand&ots=uP0hb8y5FH&sig=NIV54_oAx-[7isDT0A_QjlAmk8ClWRw#v=onepage&q=spoken%20English%20uttarakhand&f=false

[7] https://drive.google.com/drive/folders/1RDgN-1f6EdEmYvOJegNxwzltmwLcZE7Yl?usp=sharing

[8] Nanda Devi affair: Bill Aitken

[9] Cleaning an anchor in single pitch climbing :https://americanalpineclub.org/resources-blog/2016/3/15/5ipkouk0id07cgc3dqks4fljnsgnx6

[10] https://drive.google.com/file/d/1oF8P-pICfSWUbx9u9ZOQ_QSEM5ip1H9AG/view?usp=sharing

[11] C.Sorensen, D.M. Baylen, Interaction in interactive Television instruction: perception versus reality, in:Proceedings of the Annual Meeting of the American Educational Research Association, Montreal, Quebec, Canada, 1999.

[12] D.E. Leidner, S. Jarvenpaa, The use of information technology to enhance management school education: a theoretical view, MIS Quaterly 19(3), 1995, pp. 265-291

[13] N.A. Baloian, J.A. Pino, H.U. Hoppe, A teaching/learning approach to CSCL, in: Proceedings of the 33rd Hawaii International Conference on Systems Sciences, 2000, pp. 447–456.

A. Kumar, P. Kumar, S.C. Basu, Student perceptions of virtual education: an exploratory study, in: Proceedings of the 2001 Information Resources Management Association International Conference, Toronto, Ontario, Canada, 2001, pp. 400–403.

G. Piccoli, R. Ahmad, B. Ives, Web-based virtual learning environments: a research framework and a preliminary assess- ment of effectiveness in basic IT skills training, MIS Quarterly 25(4), 2001, pp. 401–426.

[14] https://drive.google.com/file/d/1oF8P-pICfSWUbx9u9ZOQ_QSEM5ip1H9AG/view?usp=sharing

[15] DRS 2019: http://www.idc.iitb.ac.in/~anirudha/DRS19/

[16] Qualitative Research: https://en.wikipedia.org/wiki/Qualitative_research

[17] lohajung: https://www.euttaranchal.com/tourism/lohajung.php

[18] Villages in Chamoli District: http://www.onefivenine.com/india/VillagesInDistrict/Chamoli

[19] On wrong trek: The ecological perils of commercial hiking https://www.downtoearth.org.in/blog/on-wrong-trek-39933

[20] Clove hitch: https://en.wikipedia.org/wiki/Clove_hitch

[21] List of friction hitch knots : https://en.wikipedia.org/wiki/List_of_friction_hitch_knots

[22] Grashan: https://hi.wikipedia.org/wiki/

[23] How to create and use analogies effectively in the teaching of science concepts, Charles B. Hutchison and Bobby L. Padgett II

[24] https://drive.google.com/file/d/1oF8P-pICfSWUbx9u9ZOQ_QSEM5ip1H9AG/view?usp=sharing

[25] Pg 70:Science Activities, Vol.44 No.2 How to create and use analogies effectively in the teaching of science concepts, Charles B. Hutchison and Bobby L. Padgett II

[26] Gentner, D., M. J. Rattermann, and K. D. Forbus. 1993. The roles of similarity in transfer: Separating retrievability from inferen- tial soundness. Cognitive Psychology 25 (4): 431–67.