

外科医の評価

医学教育において最も深刻な問題の1つは、パフォーマンスの観察に基づいた評価やフィードバックの欠如である

John Norcini and Vanessa Burch 2007

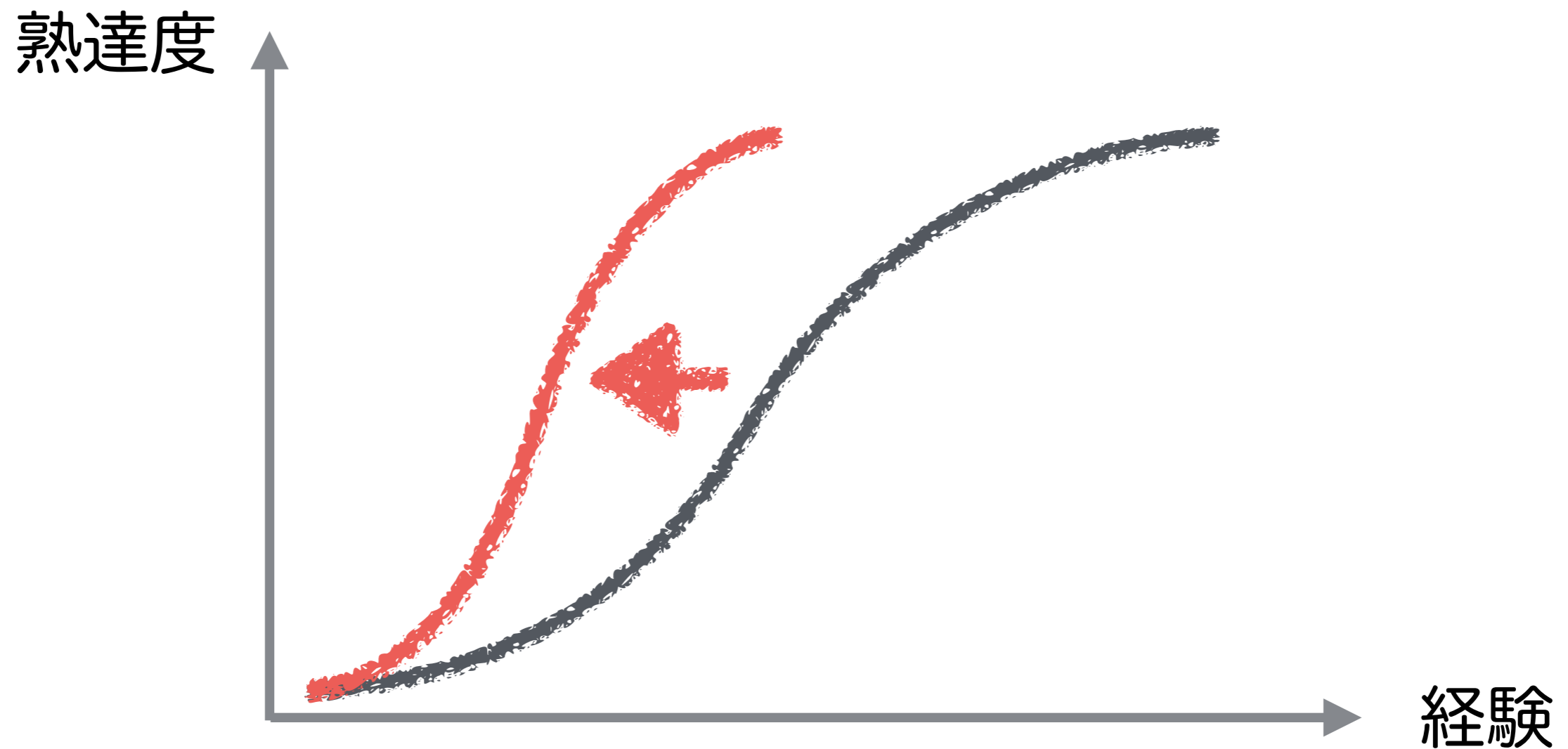
北海道大学消化器外科 II
渡邊祐介

目標

- ▶ 総括的評価と形成的評価の違いを説明できる
- ▶ 手術技能の評価を体験する
- ▶ 評価方法の手法や種類について理解する



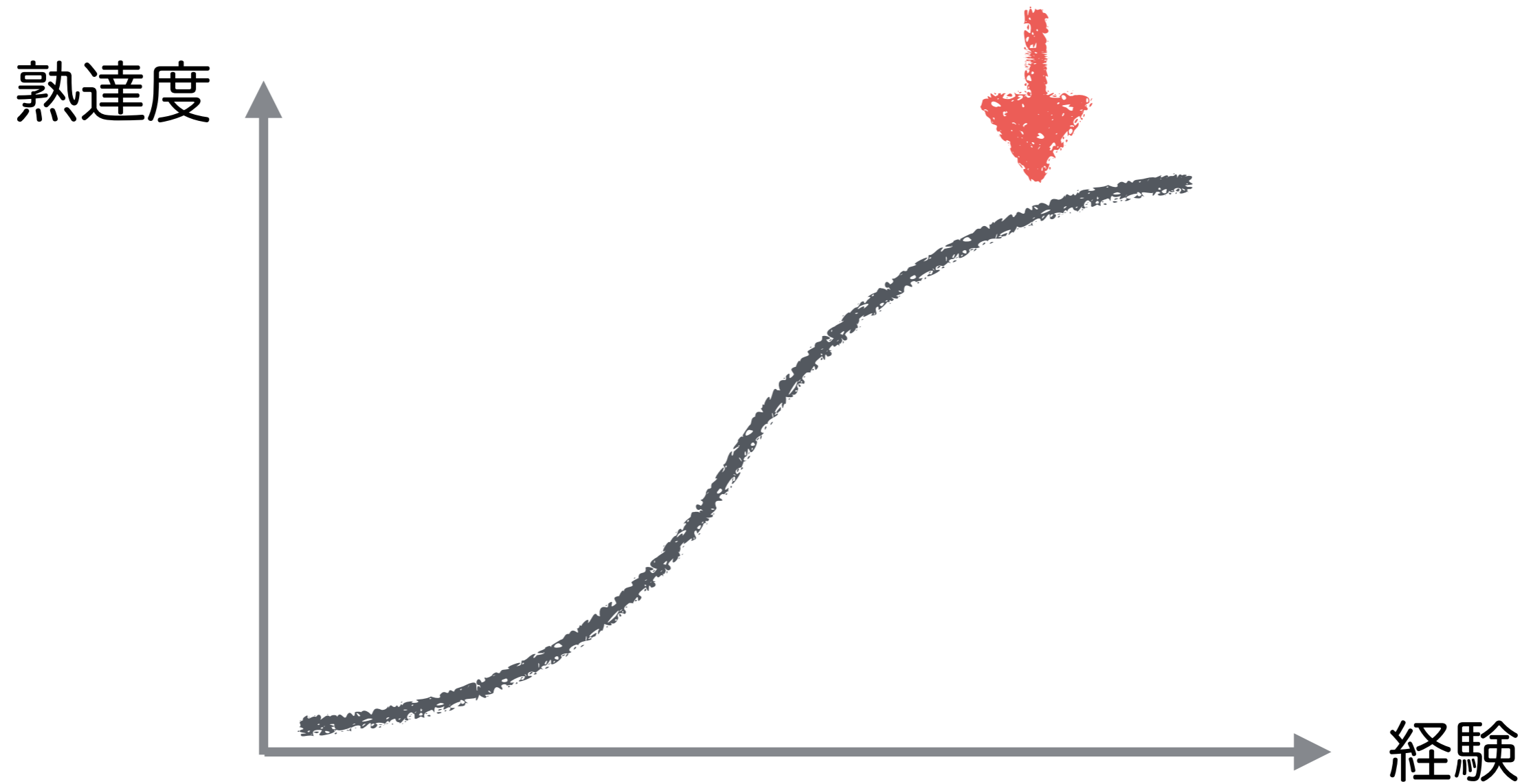
Learning Curve



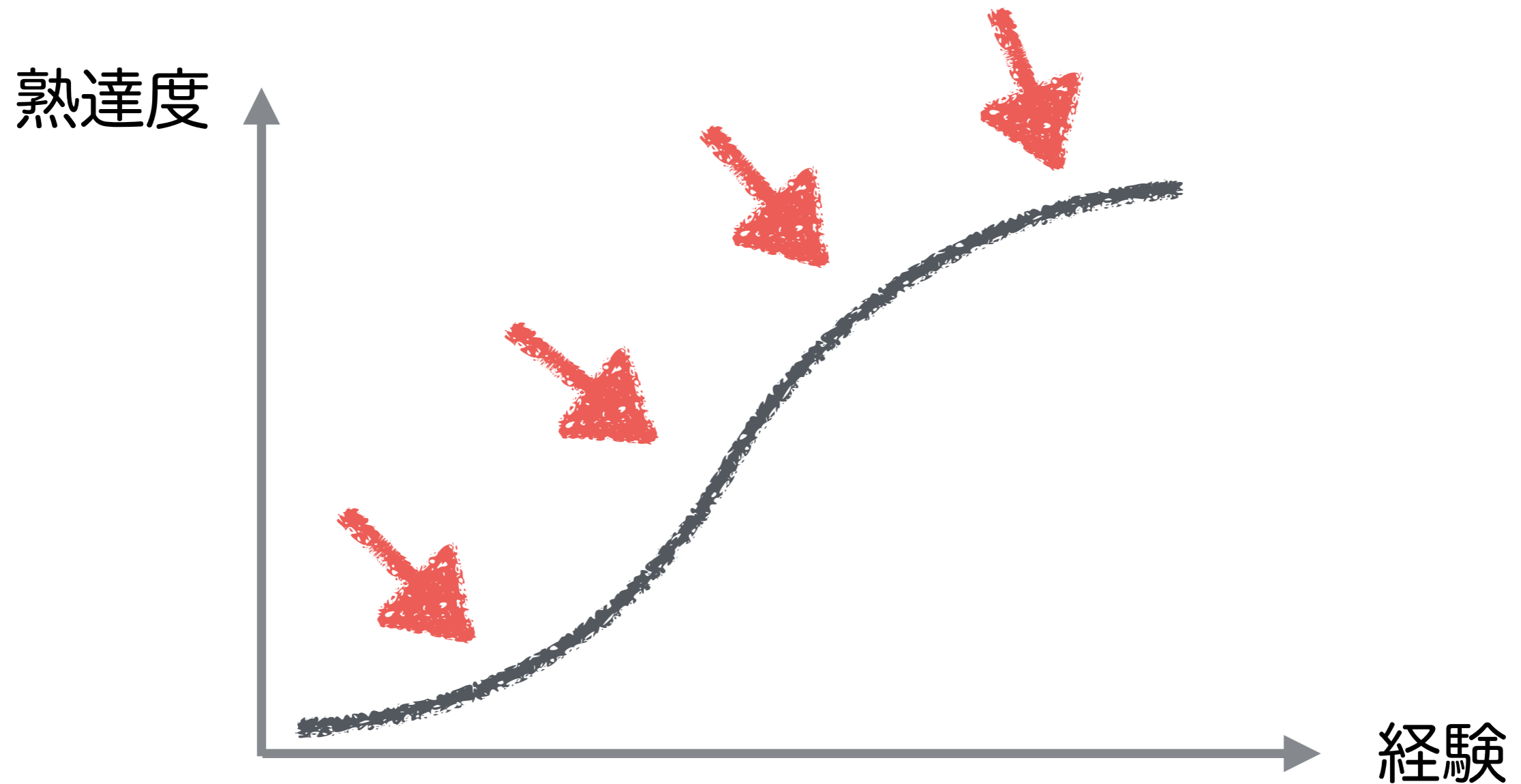
評価の違い

	総括的評価	形成的評価
例	専門医試験	EPOC, フィードバック
目的	合否判定, 達成度判定	現状把握(ギャップ), 成長促進
タイミング	トレーニングの終わりに 点数化 (数値化)	直後, 具体的フィードバック
学習者	関わらない	積極的に関わる
モチベーション	外因的	内因的
学習への影響	弱, 短期的	強, 長く持続する

Learning Curve



Learning Curve



評価の重要性

到達度確認

学習促進

情報共有



Instructional Design

目標

評価

フィードバック



評価の種類

知識

多肢選択問題, 口頭試問

技術

パフォーマンスアセスメント

態度

OSCE

判断力

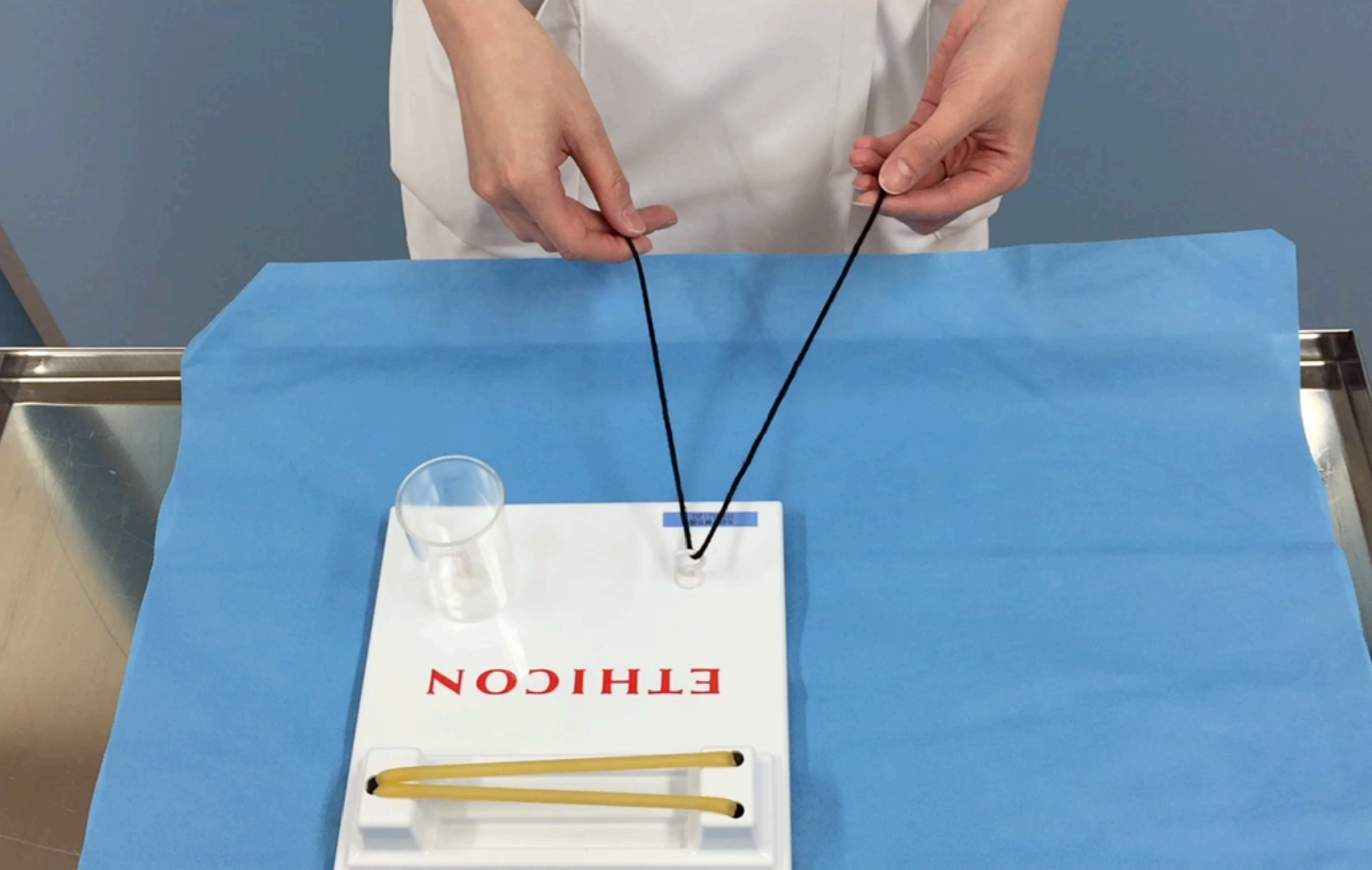
達成度

360° 評価



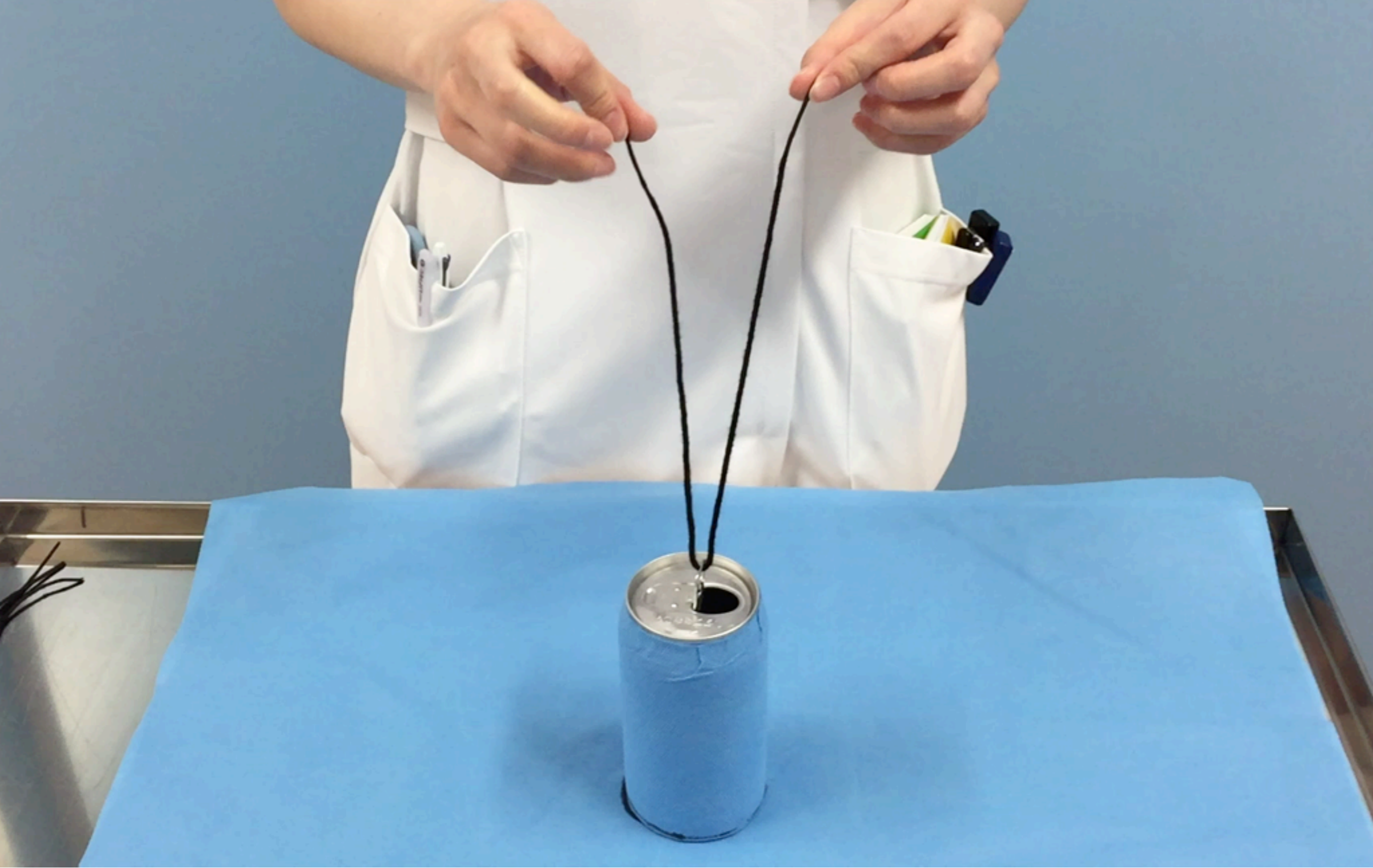
結紮





どう思いましたか？





どう思いましたか？



Instructional Design

タスク分析



目標

評価

フィードバック



評価スケール作成



評価スケール作成

グループワーク



コンセンサスメソッド



結集縫合評価ツール



結紮縫合練習法

Development, Validation, and Implementation of a Cost-Effective Intermediate-Level Proficiency-Based Knot-Tying and Suturing Curriculum for Surgery Residents

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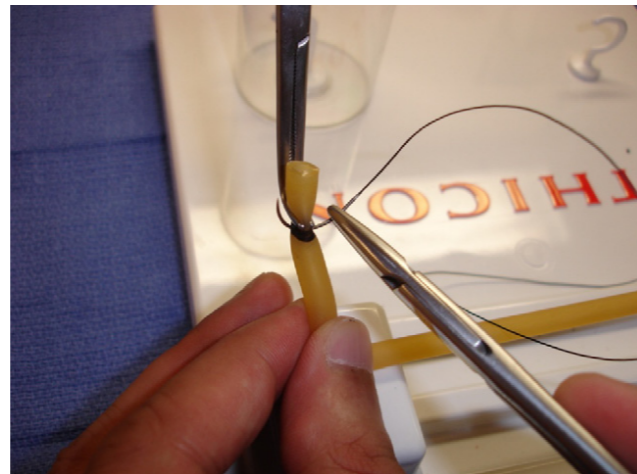
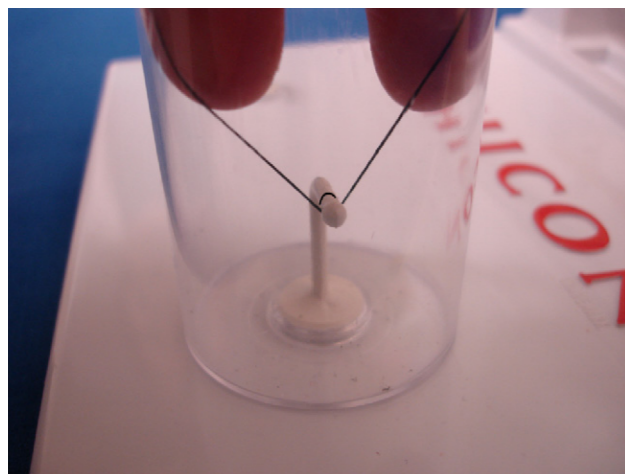
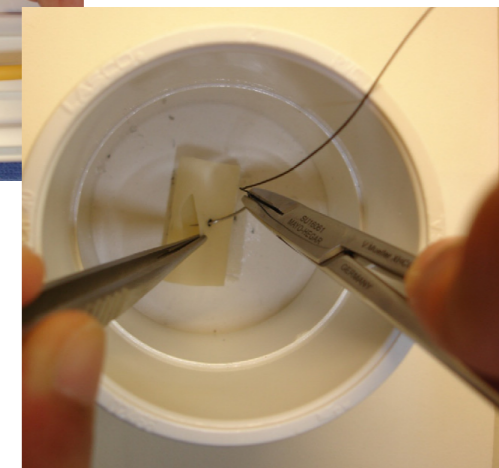
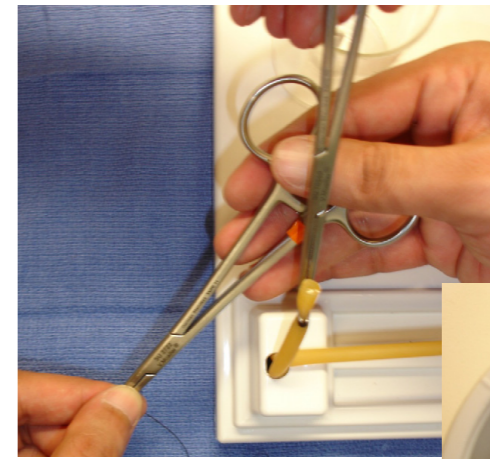


TABLE 1.

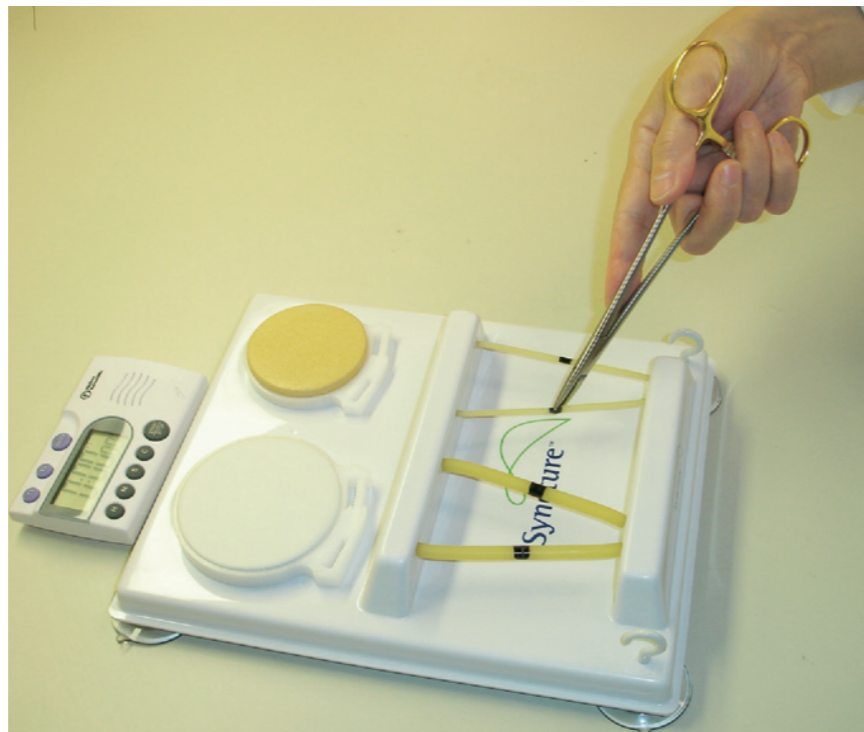
Task	Description
Task 1: Tie at depth	<p>Place 2-0 silk ligature around a post (enclosed in a plastic cup) between the ball and the black line (1 mm) on the Ethicon knot-tying model and tie 3 square knots (either 1- or 2-handed). Time starts with 1 end of the tie in each hand, outside the cup; time stops with completion of the final knot.</p> <p>Errors: accuracy, gap, slippage, breakage Cutoff time: 60 seconds Expert proficiency level: 41 (19 seconds with no errors)</p>
Task 2: Suturing at depth	<p>The trainee must place a simple interrupted suture using 2-0 silk suture (30 cm) on a tapered needle and tie 3 square knots (either 1- or 2-handed) on the FLS suturing model. Time starts with the needle loaded in the needle driver in the dominant hand and the forceps held in the non-dominant hand; time stops when both suture tails have been cut to 1cm in length.</p> <p>Errors: accuracy, gap, slippage, breakage, palming, loading (not loading within the wound), Avulsion Cutoff time: 180 seconds Expert proficiency level: 154 (26 seconds with no errors)</p>
Task 3: Tie on a pass	<p>2-0 silk ligature attached to the tip of a curved hemostat. The trainee first wraps the tie around (and under the right angle clamp held by the assistant) on the cut rubber tubing (with 1 mm of the 2 mm colored segment exposed); 1 square knot is tied (either 1- or 2-handed) and the clamp is released after the trainee says "off." The trainee then ties 2 additional square knots. Time starts with the tie secured in the curved hemostat; time stops with the completion of the third square knot.</p> <p>Errors: accuracy, gap, slippage, breakage Cutoff time: 120 seconds Expert proficiency level: 102 (18 seconds with no errors)</p>
Task 4: Suture ligation (stick tie)	<p>2-0 Silk suture (30 cm) on a tapered needle. Trainee must pass the needle through the rubber tubing (under the right angle clamp held by the assistant) with 1 mm of the 2 mm colored segment exposed. The trainee then ties 1 square knot (either 1- or 2-handed). The trainee then passes the suture tail around the right angle clamp and then ties 1 square knot. The clamp is released when the trainee says "off." The trainee then ties 2 additional knots. Time starts with the needle passage through the rubber tubing; time stops with the completion of the fourth square knot.</p> <p>Errors: accuracy, gap slippage, breakage Cutoff time: 120 seconds Expert proficiency level: 95 (25 seconds with no errors)</p>
Task 5: Ties in Continuity	<p>The trainee first passes the 4-0 silk ligature (preloaded on curved hemostats) to the proctor holding the right angle clamp exposing the tubing. The first ligature is held by the proctor in the left hand towards the bench. The second ligature is passed to the proctor holding the right angle clamp and the trainee then ties 3 square knots (either 1- or 2-handed). The trainee then ties the first ligature using 3 square knots (either 1- or 2-handed). The rubber tubing between the 2 ligatures is cut, and both tails are cut to 2 mm in length. Time starts with passage of the first curved hemostat to the assistant; time stops when the last pair of suture tails has been cut.</p> <p>Errors: gap, slippage, breakage, cuff error (cuff is <2 mm) Cutoff time: 180 seconds Expert proficiency level: 141 (39 seconds with no errors)</p>
Task 6: Atraumatic tie	<p>4-0 Silk ligature is passed through the pop up tab ring (which is epoxied in the "up" position) on the 12 oz soda can. Using either a 1- or 2-handed technique, the trainee ties 3 square knots within the 4mm marked target area on the tab. Time starts with each of the 2 strands of ligature in both hands; time stops when the last square knot has been tied.</p> <p>Errors: accuracy, gap, slippage, breakage, movement Cutoff time: 60 seconds Expert proficiency level: 40 (20 seconds with no errors)</p>

結紮縫合練習法

A Cost-Effective Proficiency-Based Knot-Tying and Suturing Curriculum for Residency Programs

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Task Descriptions and Expert Proficiency Levels

Task 1: Palm needle driver	
Model	Suture board
Description	Grasp 5 mm colored segment on thin single rubber tubing by opening and closing (3 full clicks) the needle driver held by palming only and perform the maneuver 5 times
Errors	Non-closure, accuracy, instrument drop, non-palming
Cutoff time (seconds)	60
Expert proficiency score	53 (7 seconds with no errors)
Task 2: Knot-tying, no tension, 2-handed	
Model	Suture board
Description	Tie a 46 cm 2-0 silk ligature around 5 mm colored segment on thick single rubber tubing using only a 2-handed technique, 3 square knots, time starts with tie in place, not crossed, 1 end in each hand
Errors	Accuracy, gap, slippage, breakage
Cutoff time (seconds)	60
Expert proficiency score	50 (10 seconds with no errors)
Task 3: Knot-tying, no tension, 1-handed	
Model	Suture board
Description	Tie a 46 cm 2-0 silk ligature around 5 mm colored segment on thick single rubber tubing using only a 1-handed technique, 3 square knots
Errors	Accuracy, gap, slippage, breakage
Cutoff time (seconds)	60
Expert proficiency score	50 (10 seconds with no errors)
Task 4: Knot-tying, under tension, 2-handed, surgeon's knot	
Model	Suture board
Description	Tie a 46 cm 2-0 silk ligature around 5 mm colored segments to approximate thick double rubber tubing set using only a 2-handed technique, surgeon's knot then 2 squares (3 knots total)
Errors	Accuracy, Gap, Slippage, Breakage
Cutoff time (seconds)	60
Expert Proficiency Score	47 (13 seconds with no errors)
Task 5: Knot-tying, under tension, 2-handed, slip knot	
Model	Suture board
Description	Tie a 46 cm 2-0 silk ligature around 5 mm colored segments to approximate thick double rubber tubing set using only a 2-handed technique, slip knot on first 2 throws then 2 square throws (4 knots total)
Errors	Accuracy, gap, slippage, breakage
Cutoff time (seconds)	60
Expert proficiency score	45 (15 seconds with no errors)
Task 6: Knot-tying, under tension, 1-handed, slip knot	
Model	Suture board
Description	Tie a 46 cm 2-0 silk ligature around 5 mm colored segments to approximate thick double rubber tubing set using only a 1-handed technique, slip knot on first 2 throws then 2 square throws (4 knots total)
Errors	Accuracy, gap, slippage, breakage
Cutoff time (seconds)	60
Expert proficiency score	45 (15 seconds with no errors)
Task 7: Suturing, interrupted, simple	
Model	FLS Penrose drain
Description	30 cm, 3-0 undyed polysorb on tapered needle, pass needle through 2 inked targets for simple interrupted suture, instrument tie surgeon's knot then 2 squares (3 knots total)
Errors	Accuracy, gap, slippage, breakage, non-palming, needle loading
Cutoff time (seconds)	120
Expert proficiency score	102 (18 seconds with no errors)
Task 8: Suturing, interrupted, horizontal mattress	
Model	FLS Penrose drain

continued

Description	30 cm, 3-0 undyed polysorb on tapered needle, pass needle through 4 inked targets for horizontal mattress suture, instrument tie surgeon's knot then 2 squares (3 knots total)
Errors	Accuracy, gap, slippage, breakage, non-palming, needle loading
Cutoff time (seconds)	120
Expert proficiency score	89 (31 seconds with no errors)
Task 9: Suturing, interrupted, vertical mattress	
Model	FLS Penrose drain
Description	30 cm, 3-0 undyed polysorb on tapered needle, pass needle through 4 inked targets for vertical mattress suture, instrument tie surgeon's knot then 2 squares (3 knots total)
Errors	Accuracy, gap, slippage, breakage, non-palming, needle loading
Cutoff time (seconds)	120
Expert proficiency score	89 (31 seconds with no errors)
Task 10: Suturing, running, simple	
Model	Wound closure pad
Description	46 cm 3-0 nylon on a cutting needle, model oriented perpendicular to bench edge, instrument tie surgeon's knot then 3 squares (4 knots total) at each corner, pass the needle through 22 inked targets to perform simple running suture, tie to loop at end, cut tails <1 cm
Errors	Accuracy, gap, slippage, breakage, non-palming, needle loading, tails
Cutoff time (seconds)	600
Expert proficiency score	435 [2'45" (165 seconds) with no errors]
Task 11: Suturing, running, subcuticular	
Model	Wound closure pad
Description	46 cm 4-0 undyed monofilament on a cutting needle, model oriented horizontal to bench edge, no inked targets, anchoring stitch in the first corner with instrument tie surgeon's knot then 3 squares (4 knots total), pass needle through subcuticular layer to perform running closure, and complete using an Aberdeen (pull through the loop) knot (4 throws), cut tails flush
Errors	Gap, breakage, non-palming, needle loading, tails
Cutoff time (seconds)	600
Expert proficiency score	396 [3'24" (204 seconds) with no errors]
Revised task 10*: Suturing, running, simple	
Model	Dasie model
Description	46 cm 3-0 nylon on a cutting needle, model oriented perpendicular to bench edge, instrument tie surgeon's knot then 3 squares (4 knots total) at each corner, pass the needle through 22 inked targets to perform simple running suture, tie to loop at end, cut tails <1 cm
Errors	Accuracy, gap, slippage, breakage, non-palming, needle loading, tails
Cutoff time (seconds)	600
Expert proficiency score	435 [2'45" (165 seconds) with no errors]
Revised Task 11*: Suturing, running, subcuticular	
Model	Dasie model
Description	46 cm 3-0 nylon on a cutting needle, model oriented horizontal to bench edge, no inked targets, anchoring stitch in the first corner with instrument tie (surgeon's knot then 3 squares (4 knots total), pass needle through subcuticular layer to perform running closure, and complete using an Aberdeen (pull through the loop) knot (4 throws), cut tails flush
Errors	Gap, breakage, non-palming, needle loading, tails
Cutoff time (seconds)	600
Expert proficiency score	396 [3'24" (204 seconds) with no errors]
Task 12**: Suturing, interrupted, subcuticular	
Model	Dasie Model
Description	any length 3-0 nylon on a cutting needle, model oriented parallel to bench edge, 1.5 cm long full thickness incision in the model (no inked targets), place a single buried subcuticular suture in a vertical fashion (perpendicular to the incision) with an instrument tie [surgeon's knot then 3 squares (4 knots total)], cut tails flush with the model surface
Errors	Gap, breakage, non-palming, needle loading, tails
Cutoff time (seconds)	120
Expert proficiency score	87 (33 seconds with no errors)

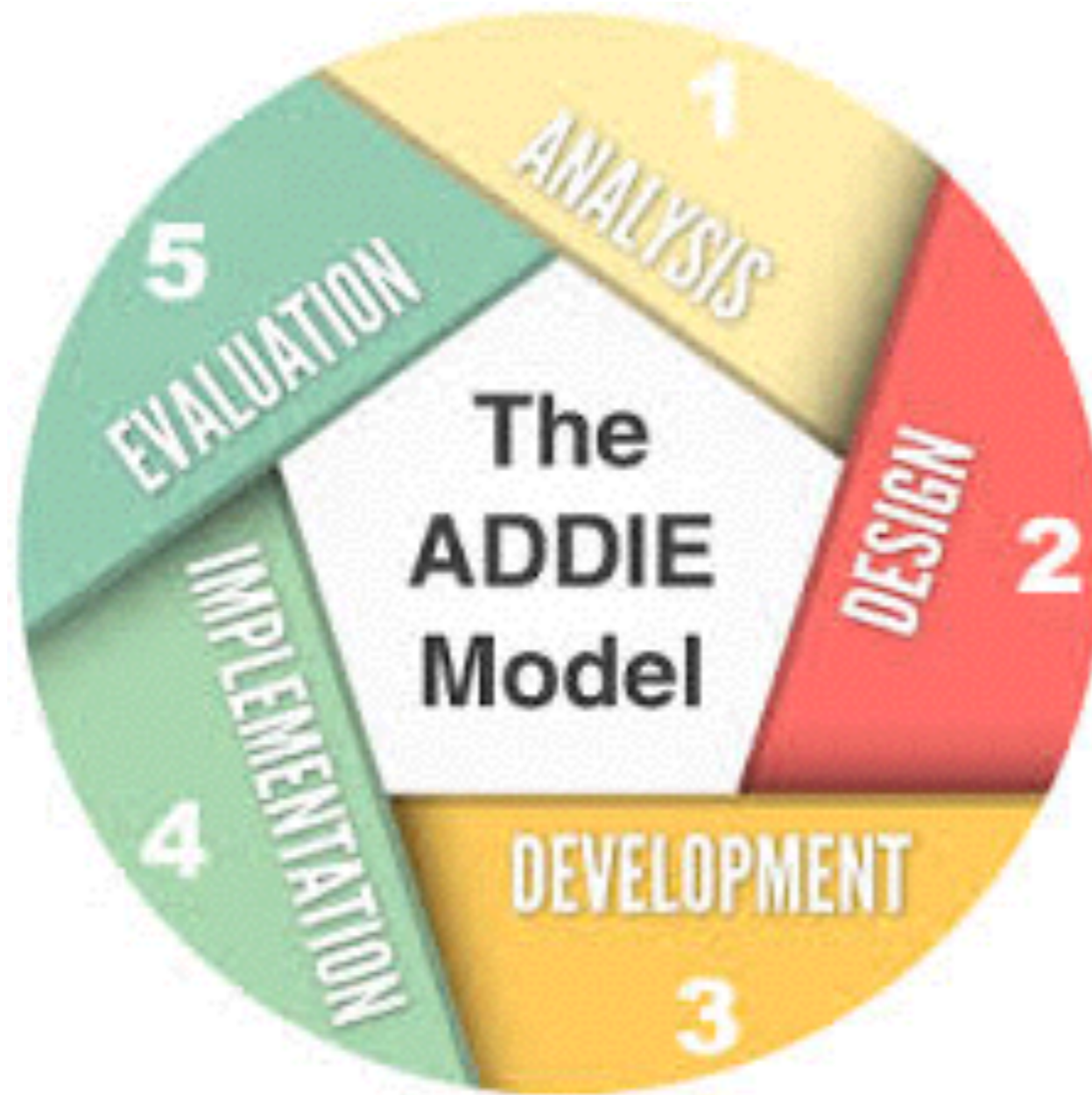


Instructional Design

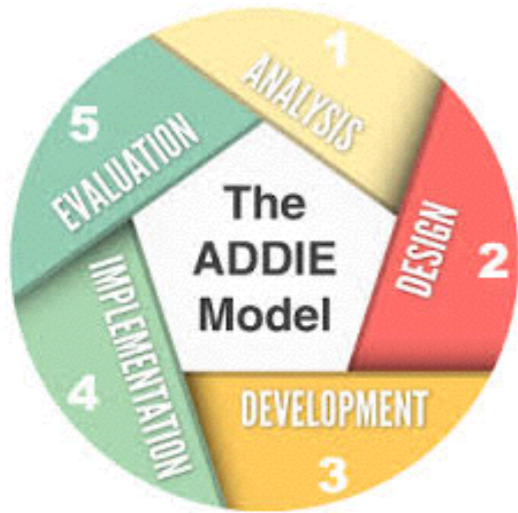
カークパトリックの4段階評価モデル



Instructional Design



Instructional Design



目標

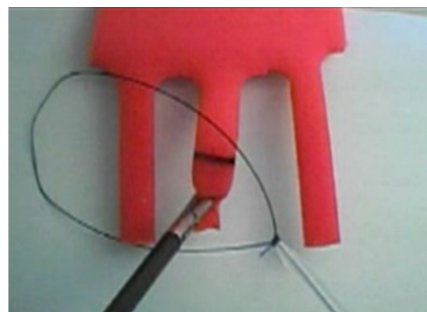
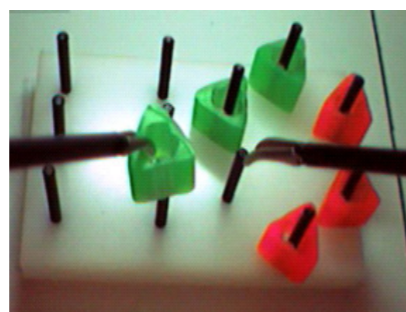
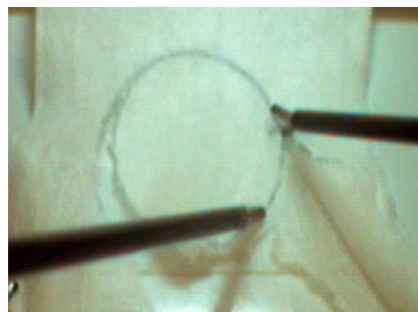
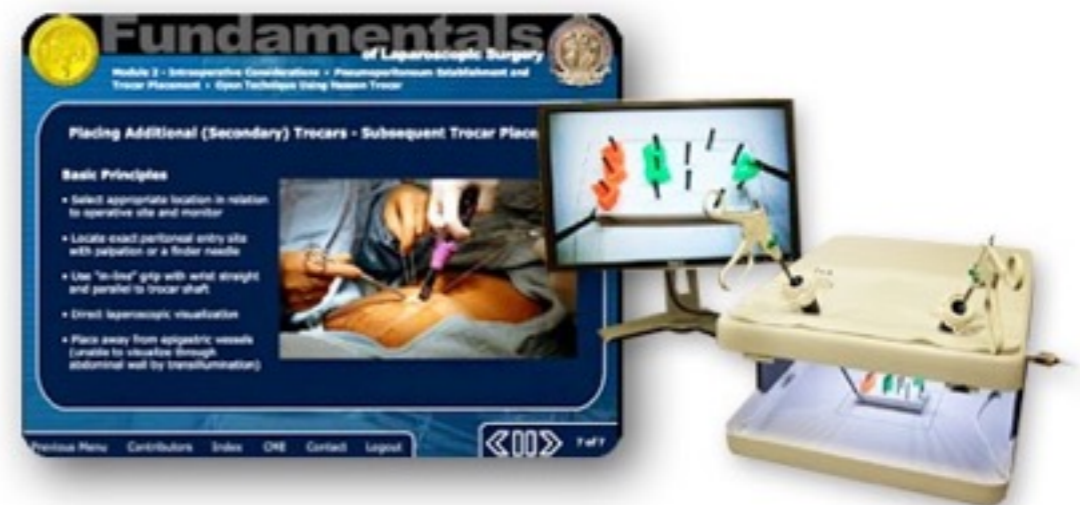
重要性, 難易度, 関連性

方略

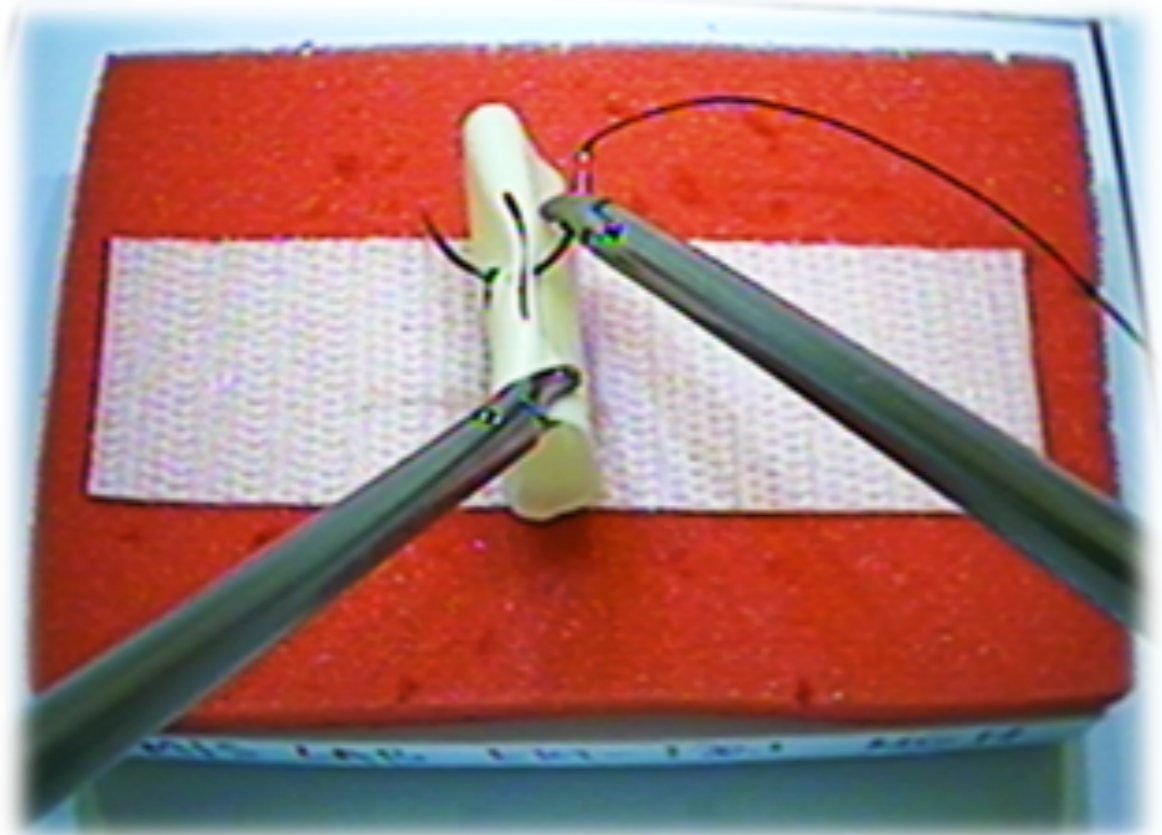
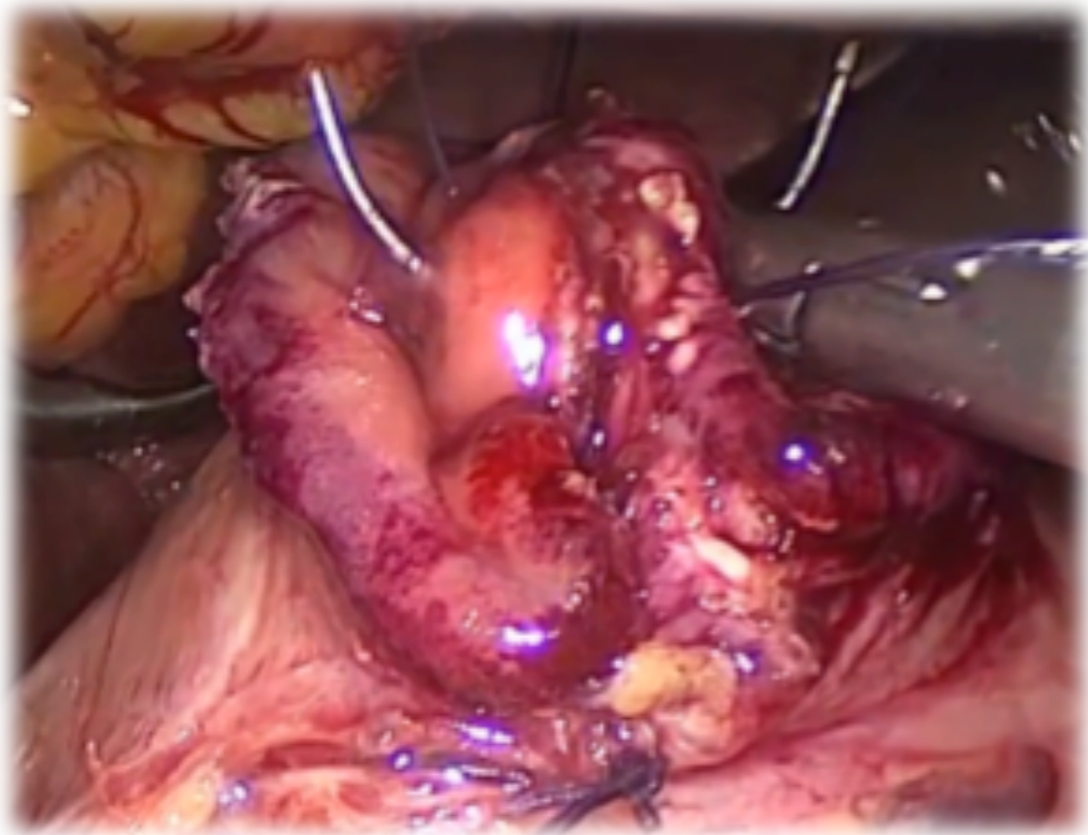
人, 物, 時間, 教授法



Time and Accuracy



Laparoscopic suturing





60% of PDs felt that

Graduates are **NOT** proficient
in laparoscopic suturing

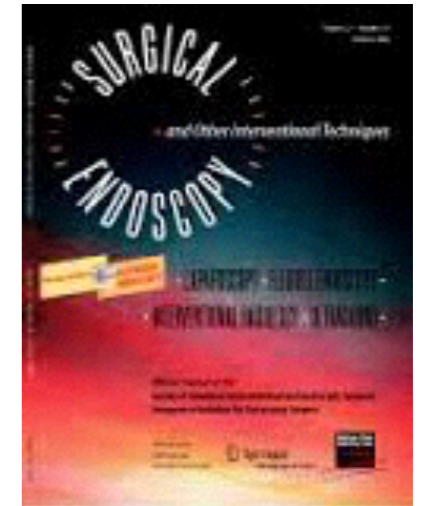
Matter et al. Annals of Surgery 2014





New models for advanced laparoscopic suturing: taking it to the next level

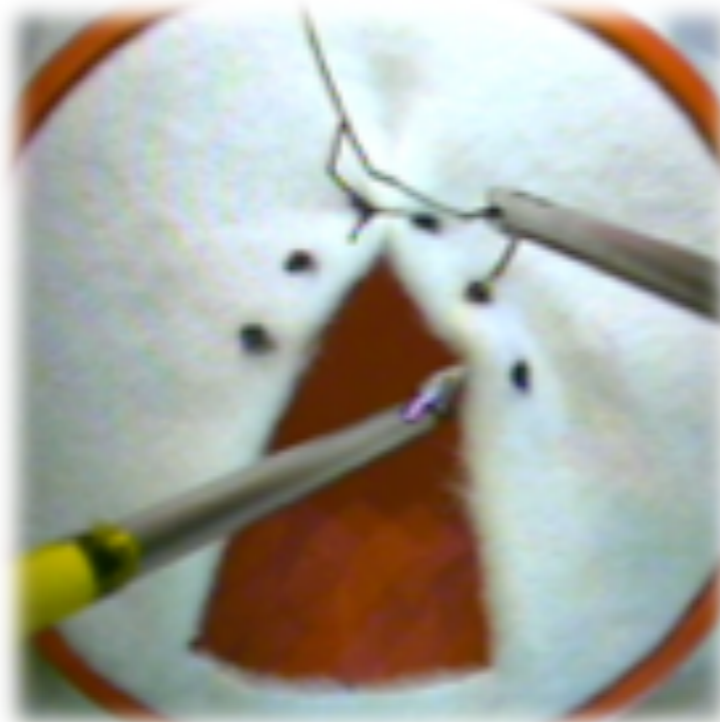
Yusuke Watanabe¹ · Katherine M. McKendy¹ · Elif Bilgic¹ · Ghada Enani¹ · Amin Madani¹ · Amani Munshi¹ · Liane S. Feldman¹ · Gerald M. Fried¹ · Melina C. Vassiliou¹



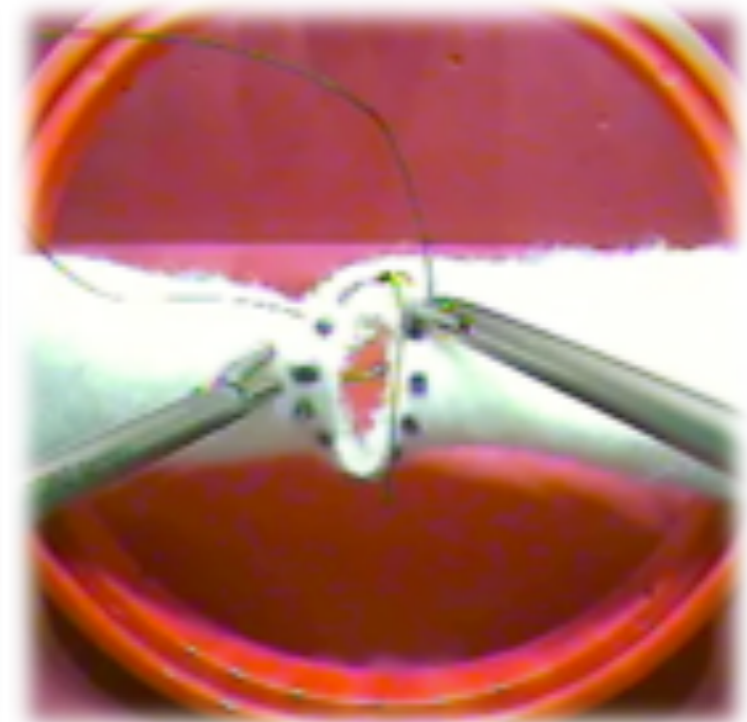
Needle Handling



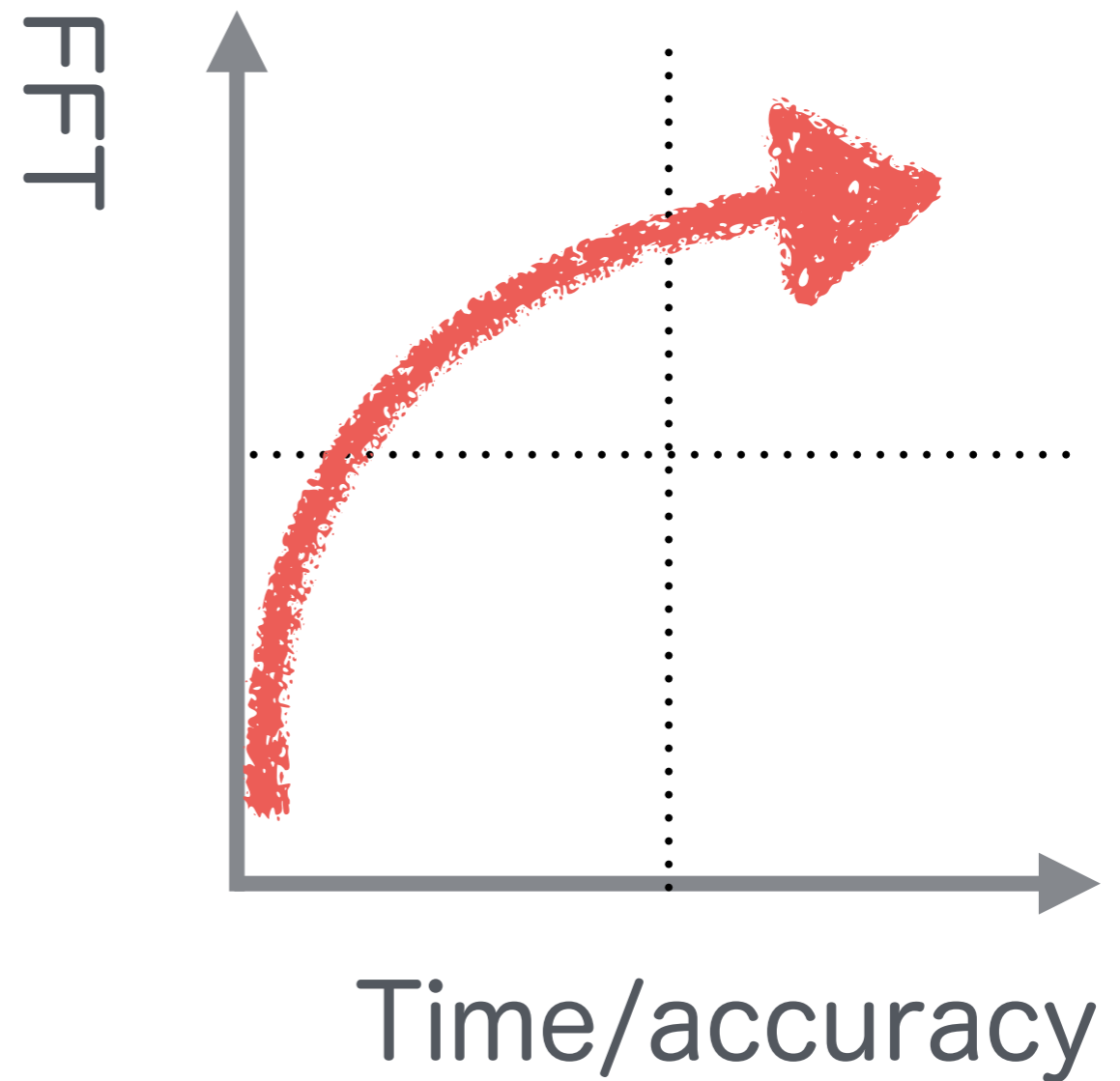
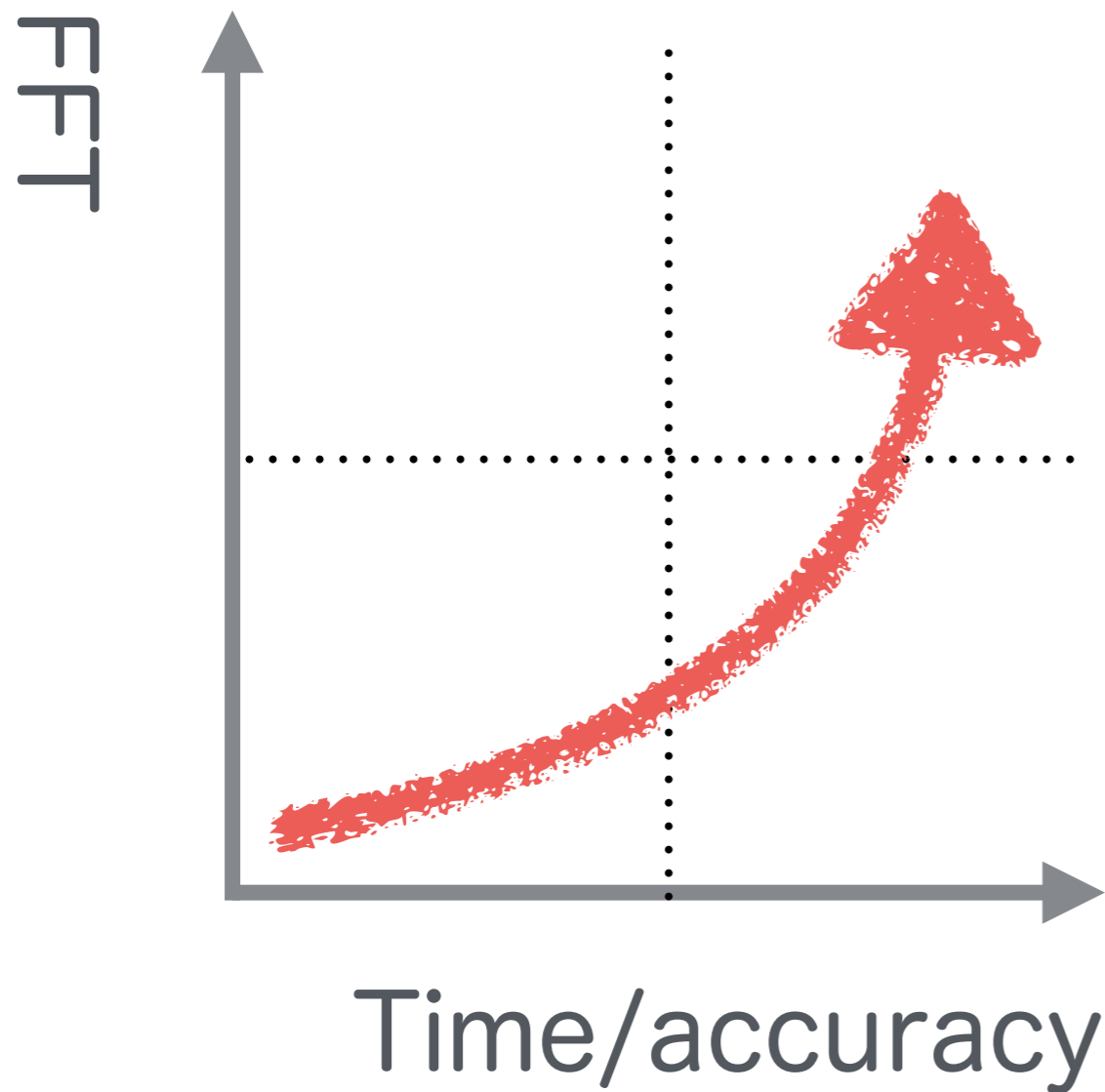
Under Tension



Continuous Suturing



時間/エラー vs クオリティー



妥当性と信頼性

A systematic review of performance assessment tools for laparoscopic cholecystectomy

Yusuke Watanabe^{1,2} · Elif Bilgic¹ · Ekaterina Lebedeva³ · Katherine M. McKendy¹ · Liane S. Feldman¹ · Gerald M. Fried¹ · Melina C. Vassiliou¹

